Vol. 121, No. 15

PAPER TRADE JOURNAL

Title Reg. U. S. Pat. Off.

October 11, 1945

NPTA Publishes New Standards

Two more endorsements to a proposed simplification of weights and standards for paper were added last week to the list of industrial approvals of the projected new standards for the paper industry. The Printing Industry of America, Inc., at its convention in Pittsburgh, and the Graphic Arts Trade Association Executives, which met during the same convention, both adopted resolutions expressing their sanction of the method of grading paper by weight.

This is the method which, after considerable discussion has been evolved by the Committee on Simplification of Weights and Standards of the National Paper Trade Association, and has been placed before the industry and related trades for study and approval. At a meeting of a special committee in Chicago on June 20 an outline of the project was drawn up.

Seven points in the project have been reduced to single-sentence identity. These propose:

Seven Points in Program

(1) That the weight in pounds of all classes of Fine and Wrapping Papers which are designated and sold by weight be computed and listed on the basis of 1000 sheets of 1000 square inches.

(2) That the standard basis weights of all classes of Fine Papers which are designated and sold by weight fall on one or more of the following basis weights of 1000 sheets of 1000 square inches: 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 85, 90, 95, 110, 130, 150, 170, 190, 210, 230, 250, 270, 290, 330, 360, 390, 420, 450, 480, 540, 570, 630.

(3) That the standard basis weights of such above mentioned Fine Papers and the standard sizes thereof, together with the weights in pounds per 1000 sheets of such standard sizes be those shown in the attached tables titled exhibits "A" and "B."

(4) That the standard basis weights of all classes of Wrapping Papers which are designated and sold by weight fall on one or more of the following basis weights of 1000 sheets of 1000 square inches: 15, 20, 25, 30, 35, 50, 60, 70. 85, 95, 120, 140, 165, 190, 210, 240, 260.

(5) That on a standard size sheet the weight in pounds per 1000 sheets of Fine Paper be determined to the nearest pound with decimals of .5 or over being rounded to the next higher one (1) pound whenever the area of such standard size sheet equals or exceeds the area of the smallest size sheet area made without extra charge and that the weight in pounds of a standard size sheet that is an exact multiple of a smaller standard size sheet be determined by multiplying the weight of the smaller standard size sheet by the number of times its area is exceeded by the larger standard size.

(6) That on other than standard size sheets of all classes of Fine and Wrapping Papers which are designated and sold by weight, the weight in pounds per 1000 sheets be determined to the nearest pound with decimals of .5 or over being rounded to the next higher one (1) pound.

(7) That all basis weights other than standard basis weights as defined in 2 and 4 above be limited in manufacture only to basis weights per 1000 sheets of 1000 square inches, evenly divisible by five (5).

The Committee realizes that to present a subject of this nature to the entire membership calls for explanation in great detail in order that members may intelligently evaluate it and that in turn, an obligation rests on each member to give the necessary time and attention to ensure that he understands completely this far reaching proposal. The benefits are:

1. Not taking into consideration the extreme lightweights of paper, sixty-six different standard basis weights of Fine Papers are condensed through slight changes in existing basis weights to 21.

2. The number of items made and stocked as standard will be less which, in turn, will reduce invested capital and labor in manufacturing, distribution and conversion.

3. By more widely spacing the basis weights of the different classes of paper, it will be easier to distinguish between them.

4. The space needed to list all standard sizes and weights of Fine Papers will become but a small fraction of that now required.

5. Calculation of the weight of any size sheet will become greatly simplified since it will no longer be necessary to multiply the area in square inches by the basis weight and divide the result by the area in square inches of the basic size.

6. Chances of error will be reduced by those who purchase paper by the ream and sell products made of paper by 1000 and uncertainty regarding the intended weight, due to varying practice in different markets of listing both by the ream and by 1000, will be removed.

7. Those learning the paper business and those who will become purchasers of paper will be able to understand and use the proposed system in much less time than is required to master the existing method.

8. Inconsistencies in the weight of the same size now existing among different classes of paper will be eliminated and one common method of weight calculation will apply to all kinds of paper.

9. Time spent in calculating invoices involving weight and count will be lessened by the decimal set-up of the proposed system.

10. This proposal has advantages not only for individual manufacturers and distributors but for users of paper as well.

11. The proposal will achieve all the above benefits of simplification without changing any existing basis weight to a degree which will adversely affect any process of manufacture or any use to which paper may be put.

Newsprint Industry For New Post-War Bill

Outlook Indicates Possible Retention of Some Government Controls of Print Paper For Two or More Years — Concerned About British Import Plan — Expansion Will Add To Cameau Bay Output.

MONTREAL, Que., October 8, 1945—In the newsprint industry here, where the feeling is that it would not be desirable to relinquish government controls over newsprint supplies and allocations of newsprint until the situation becomes much more clear than at present in regard to basic supplies of raw pulpwood, satisfaction is expressed at the announcement that the federal Government, at the present session of Parliament, will introduce a post-war Emergency Powers Bill to take care of wage, price and ration controls when the War Measures Act is withdrawn. Under this statute the Government will be permitted to continue the Wartime Prices and Trade Board and other agencies which exercise control over the business of the nation, possibly with discretionary powers in deciding when these various controls should be removed.

Lately there has been considerable pressure on the Government to remove the controls as speedily as possible but, as in the case of the newsprint industry, there is evidence of a desire to retain many of them, for a time at least. According to informed sources, the outlook at the present time is for about two or three years to pass before final wartime control is abandoned, and in any case the Government is committed to a policy of retenttion of controls as long as they are considered necessary in the battle against inflation. Respecting the newsprint industry the idea is that no useful purpose can be served in abolishing existing controls until it is seen how successful is the campaign to recruit some 50,000 extra workers for cutting operations in the forests this winter, and until it is further seen whether or not the river driving of next spring will be successful in providing enough pulpwood for much larger production of newsprint than is now possible.

On the general question of price controls, which affects the industry directly, and also to a very large extent indirectly, an official study by an interdepartmental committee of the Government has resulted in the following report:

"Where price increases are clearly necessary, price adjustments will be permitted but in most cases ceilings should be raised and not removed. When ceilings are removed it will frequently be desirable to take them off for whole groups of commodities at once."

"However, there might well be instances where it would be necessary for administrative reasons to remove a particular commodity or service from ceiling control before other related lines could be released."

Newsprint Exports to Britain

Much concern has been evident here over reports that the British Government proposes suspending imports of newsprint from Canada as part of its plan for coping with the difficulties created by a shortage of dollar exchange. The Canadian Government has taken these reports so seriously that it has instructed its representatives in the United Kingdom to investigate the matter.

Replying to questions in the House of Commons, the Minister of Trade and Commerce stated that the Government had received no official word of the reported suspension, but had received unofficial word and had instituted immediate inquiries in United Kingdom circles.

"The Trade Department," said the Minister, "is not deeply worried about the immediate effects of the suspension, but it is anxious about the long-term effects. It is with the long-term effects that we are really concerned, and we are in touch with the United Kingdom officials."

Prior to the war Canada was exporting about 175,000 tons of newsprint per annum to the United Kingdom. The volume decreased during the war until in 1943 little more than 30,000 tons were exported. Lately the exports to Britain have been increasing. For the first eight months of the present year they have amounted to 64,861 tons, as compared with 28,245 tons in the similar period of 1944.

If British suspension of newsprint imports from Canada were only temporary it would cause little concern to Canadian manufacturers, as the tonnage could easily be absorbed elsewhere, but a permanent suspension would be a very different matter, as it would cut off a prospective trade that might eventually involve some ten million dollars per annum.

At present the newsprint manufacturing industry in Britain is anything but flourishing. Sir Eric Bowater, head of the largest newsprint manufacturing concerns there, recently stated in Montreal that the price of newsprint was so unremunerative that the tendency of manufacturers was to shift to other lines of manufacture wherever possible. With a closed market the situation might be different.

Building Program at Comeau Bay

Further particulars are now available of the building program of the Quebec North Shore Paper Company at its plant at Comeau Bay, Quebec, entailing expenditures of some $2,000,000 to $3,000,000. One effect will be to increase the capacity of the plant by 10,000 tons per annum of sulphite pulp and the number of employees by about 20. This pulp will be for sale in the American market. At present the capacity of the plant is as follows: Newsprint, 840,000 pounds per 24 hours; ground wood, 740,000 pounds 24 hours; unbleached sulphite fiber, 120,000 pounds 24 hours.

Construction consists of extensions to existing buildings and includes paper storage buildings, 83 ft. by 560 ft. by 50 ft. high; digester building, 25 ft. by 40 ft. by 80 ft. high and sales pulp building, 76 ft. by 300 ft. by 50 ft. high. They are being erected on concrete foundations of structural steel framework, brick and tile walls with roofs of 20 year bonded construction except in the case of the paper storage building which will have a concrete slab roof and corrugated asbestos siding walls. They will be completed in November or December and the entire equipment will be installed by the end of February.

The sales pulp building will house a pulp dryer. The extension to the paper storage building is required for storage of the new production and the digester building extension will house the digester in which the extra sulphite pulp will be produced.

★

When the Atomic Bomb hit Taylor's...

THE Atomic Bomb landed on American industry long before it devastated Hiroshima and Nagasaki. Maybe it hit you harder than it hit us. All we know is that here at Taylor Instrument, it had an impact not only on our own organization, but on our suppliers and our customers. Here is what happened:

On a spring day in 1943, the War Department called us in to ask us if we would assume the responsibilities of prime contractor on process control instrumentation for the Kellex Corporation for a secret project called the "Manhattan District." As everybody knows now, this was the Oak Ridge Atomic Bomb Project.

We were already supplying instruments to eleven major branches of the armed forces. Commitments to the super-critical synthetic rubber, 100-octane gasoline and chemical industries programs imposed heavy responsibilites. On top of this, war industries' needs were increasing. Materials were scarce and manpower scarcer. But we were told this was an opportunity to help shorten the war. So of course there could be but one answer.

Our responsibilities included the development, design and production — in unprecedented quantities — of a score of new types of instruments, involving new principles, and closer operating tolerances than had ever before been required of process control instruments. In addition, we were asked to loan a number of our top engineers and technicians to the project.

Our production schedules had to be overhauled. Directives over-rode high-rated war orders. Civilian orders stood at the far end of the line. But the problems were solved, because thousands of people in our plants and in those of our subcontractors devoted their whole time to the project to the extent of seven days a week, month after month.

Naturally, we're proud of the way our organization came through. But we're proud too of our many, many customers who showed patience and understanding in the face of temporary delays in delivery for which we could only offer phoney-sounding excuses. Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada. *Taylor Instruments mean "Accuracy First."*

News of the Wisconsin Paper Industry

Wilson Pollock of Valley Iron Works Honored By Army Award For Atomic Bond Development — Explains Legality of Tax Assessment — Traces Progress of Municipal Forest — Other Mill News.

APPLETON, Wis., October 8, 1945—An Army award was given Thursday evening, October 4, to S. Wilson Pollock, development engineer for the Valley Iron Works, Appleton, at a Biltmore hotel banquet in New York City for his work on the atomic bomb. The dinner was given in honor of men who made special contributions to the design and production of the bomb.

Mr. Pollock was a project engineer in charge of special development work done by the American Machine and Foundry Company in 1942 for the M. W. Kellogg Company. After the government took over the research, Kellogg set up a separate corporation called the Kellex Corporation, and Mr. Pollock was resident engineer for Kellex at Allis-Chalmers, Milwaukee, Wis., administering all engineering in connection with the project.

He was also associated with the design and development of the jellied gasoline incendiary bomb used against Japan. Other work he undertook during the was has included mechanical design work for shipboard radar equipment and various special experimental scientific equipment.

Explains Legality of Tax Assessment

State Tax Commissioner Arthur E. Wegner, Madison, Wis., last week informed city officials at Marinette, Wis., that the Wisconsin Tax Commission cannot act in the proposed lowering of the assessment of the Marinette Paper Company, Marinette, by $181,000 unless a formal complaint is made that the assessment is "radically out of proportion" to the general average of property assessments.

The city officials had written Mr. Wagner, informing him that a board of review meeting at which the paper company's assessment had been reduced was illegal, and asking the commission to make the meeting legal. The lowered assessment would amount to a reduction of about $7,000 in taxes annually.

Mr. Wegner told the city officials, who are also members of the board of review, that he has no authority to pass on the legality of the meeting, but that if it was illegal the lowered assessment would be invalid.

To obtain commission action, he wrote, three or more taxpayers must appeal for a formal hearing, stating that the new assessment was radically out of proportion to others in the district.

Describes Progress of Municipal Forest

How Merrill, Wis., is creating a municipal forest was described in the October issue of The Municipality, publication of the League of Wisconsin Municipalities by W. H. Aubuchon, mayor of Merrill.

He credited Trees for Tomorrow, Inc., a semi-public reforestation organization of Wisconsin valley paper mills, which has its headquarters in Merrill, with presenting the idea to the city council. A special committee was appointed to study the proposal, especially from the standpoint of recreational and revenue-producing possibilities.

A forester on the staff of the University of Wisconsin, Madison, Wis., visited the proposed site and supplied necessary data, also outlining forestry management procedure and stressing the work opportunities the tract would offer. Before the 840-acre tract was acquired, a soil reconnaissance survey was made by the U. S. Soil Conservation Service.

The committee in its report to the council also emphasized the living memorial angle of the project, pointing out that the passing of the years would add rather than detract.

The city purchased the land from the county, and the city clerk has set up special accounts to carry the forest along as a part of the city's business. The tract is being mapped to show the amount of reforestation needed, the areas under rejuvenation, the age classes and the present cover types.

Members of the council, chamber of commerce, the Rotary and Lions Clubs, high school students, rural school pupils and members of 4-H Clubs helped with the initial planting of seedlings. The work was supervised by nine federal, state, county and industrial foresters.

This project is independent of one by Merrill High School students. The school has its own 560-acre forest.

During Lincoln County Reforestation Week, beginning April 29, 1945, more than 300,000 seedlings were planted throughout the county. The program was sponsored by the Merrill Chamber of Commerce and Trees for Tomorrow, Inc.

Technology Utilizes More Poplar Wood

With the help of the technical departments, Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis., was able to increase the pre-war use of poplar from 17,000 cords to 62,780 cords in 1944, according to Henry P. Baldwin, assistant director of manufacture. This was desirable because poplar can be cut by farmers and there is much in the locality.

Mr. Baldwin said that probably not as much poplar will be used at Consolidated as during the war, but he expected the volume to be between two and three times as much as before the war.

Born of the war was the Plastics division. It was organized in 1942, requiring an entirely new plant. Consoweld, a paperbase plastic, was in 100 per cent war work. It was used extensively in the glider program and for aircraft cargo flooring.

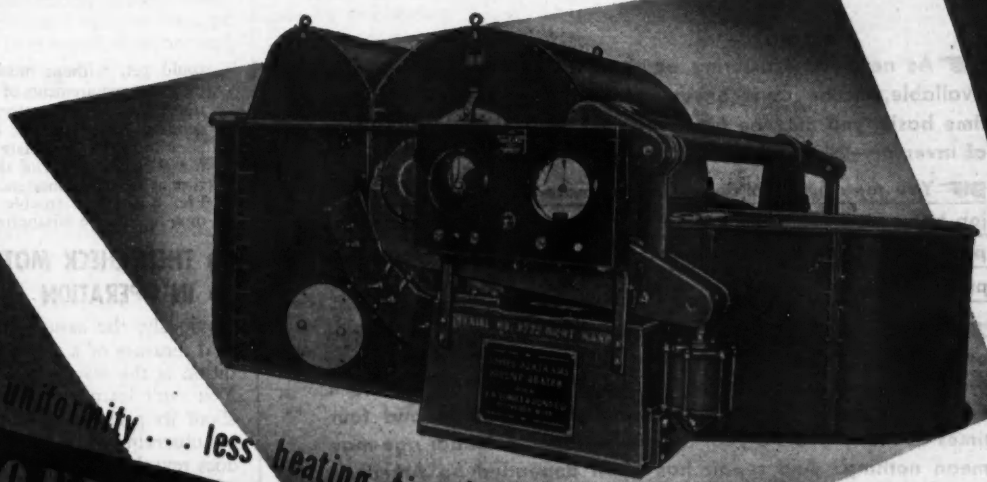
Speaks on Electrolytic Caustic

Harold Heller of the Kimberly, Wis., mill chloride department was the speaker at the 6:30 dinner meeting Tuesday evening, October 2, of the Kimberly-Clark Chemical Engineers' Society at Hotel Menasha, Menasha, Wis.

Mr. Heller, who was introduced by Arthur Parker, superintendent of the Kimberly mill and program chairman of the society, spoke on "The Blue Color of Electrolytic Caustic."

Oscar Reinke is president of the society; Kenneth Wink, vice president, and George Gerrits, Kimberly, secretary.

1 JONES-BERTRAMS BEATER = 4 HOLLANDERS



better uniformity . . . less heating time

JONES-BERTRAMS PATENT BEATER

automatic control . . . h. p. savings

Jones

E.D. JONES & SONS COMPANY-PITTSFIELD, MASS.

Builders of Quality Machinery for Paper Mills

BULLETIN!

How to Take a

Reconversion Inventory

of Your Electric Motors

As new manufacturing equipment becomes more widely available, and as you reconvert your production toward a peacetime basis, you may be faced with an unprecedented problem of inventory-taking.

You may have to determine — more quickly than such a job has ever been done before — the exact condition of every piece of existing equipment you propose to use in peacetime production.

For about four years, far greater emphasis has been placed on setting production records than on keeping maintenance records; condition of equipment is often unknown. Because much equipment has been worked during wartime three and four times as many hours a year as in peacetime, calendar age may mean nothing. And repair has often depended on American ingenuity and baling wire.

Here are some of the standards you need to determine which of your electric motors: (1) are okay as is, (2) need repair or new parts, (3) will shortly require replacement, (4) need reapplication.

These standards generally apply to all makes of motors; when in doubt on any motor, consult its manufacturer.

1 START YOUR INVENTORY WITH THE RECORDS

Begin your motor inventory with the history of each motor; you'll save much time and effort... you'll be guided quickly to the units which most need attention. Written records and the mental recollection of foremen and maintenance men are the source of this information.

Check the *master maintenance records* (though in most plants this file is out-of-date and incomplete, because of wartime pressure on production); and get *reports from foremen* (in a small plant, it may be possible to interview each man; in a large plant, it may be more efficient to distribute blank forms, such as the "MOTOR CHECK LIST" on opposite page.)

Look into the service to which the motor has been subjected in wartime: has it been overloaded? underloaded? worked 3 shifts daily? allowed to go to work in spray, steam, flood, acids? has it had mechanical injury? has it stood idle, collecting moisture and dirt?

Knowing the answers to these questions will help you spot motors that may soon give you trouble... you can start your inventory there.

NOTE: All new motors built during wartime, under WPB limitation orders, contain minimum amounts of critical materials. Thus, unlike many prewar motors, they have been incapable of withstanding continued overload operation in the way you've come to expect high-grade American motors to do. Moreover, you've had to take motors at the ratings you could get, without much regard to the exact requirements of the application. Thus, many motors have been running harder and at higher temperatures than nameplate ratings call for. Obvious result of this combination of factors is shortened insulation life. So—*expect* trouble where wartime motors are misapplied.

2 THEN CHECK MOTORS IN OPERATION

Obviously, the easiest and most practical measure of a motor's present condition is the way it is now operating. You can't learn all you need to know about its probable future performance by observing it in use, but a motor does reveal certain symptoms of trouble while doing its job.

Check the power line voltage and frequency and compare with the voltage and frequency of the motor as stated on the nameplate. To perform properly, a motor must be supplied from a line whose characteristics correspond with those for which the motor was designed.

Check rpm — hand revolution counter makes this easy. Just remove cap, hold counter against end of shaft, and take a timed reading; compare with nameplate rating.

Take temperature readings — not by the "blistered hand" or "touch and yell" system, but *accurately*, with *thermometers.*

Find the temperature of the *motor* by taping or cementing thermometer to the stator iron... take the reading, and add 15°C. (The difference between the heat on the outside surface and the possible heat of the hottest part inside).

Compare motor temperature with temperature rise rating on the nameplate. Normally a 40° rise is considered acceptable; top temperature usually should not exceed 80°C.

Take the temperature of *bearings*

either by taping or cementing thermometer to the bearing housing, or by inserting it into the oil well. In general, maximum safe bearing temperature is 96°C. (Bronze bearings may take somewhat higher temperature safely. When in doubt, consult motor manufacturer.)

Listen for — EXCESSIVE HUM. May be caused by uneven air gap, and may call for replacement of bearings. Or it may be caused by loose laminations or unbalanced rotor. Note this hum while inspecting motor in operation; check for cause later, while making inspection of parts.

Note — VIBRATION. If excessive, this may be caused by either misalignment between shafts of motor and driven machine, or through transmission of vibration in driven machine to the motor. Run motor disconnected for check. *If vibration follows motor repair,* it's probably due to out-of-balance rotor.

Listen for — RAPID KNOCKING. May be caused by misalignment, with shoulder of shaft pounding against bearing end; realign set . . . and note this knock, check bearings when making inspection of parts.

NOTE: if excessive vibration, knock, or squeal follows re-assembly of motor, cause may be incorrect axial adjustment for float.

Look for — EXCESSIVE SPARKING OF BRUSHES. Check for cause when motor is taken down for inspection.

3 THEN CHECK THE PARTS

If time permits, you'll want to give detailed inspection to *every* motor that's been in strenuous service these past years. (You may be able to work this into your regular production schedule. Set up a system so that the electrical department may be notified whenever a machine is to be down. Disassembly and inspection of motors can be done then.)

And in cases where *history* of the motor or its *operating characteristics* indicate the likelihood of present or future trouble, you'll surely want to take a close look at the parts themselves.

A. FIRST — disconnect motor leads and uncouple motor from driven unit.

B. THEN — if excessive hum was noted while motor was in operation, use feeler gauge to check air gaps between rotor and stator. Difference of more than 20% indicates overworn bearings, sleeves, or journals. Check bearings as indicated below.

C. REMOVE end housing and lift rotor out, using a sling if rotor weighs over 75 pounds. If rotor is dirty, clean it with air hose (pressure not over 30 lbs), bellows, or vacuum cleaner, or swab it with non-inflammable solvent.

D. INSPECT rotor for abrasion; corrosion; discoloration (caused by overheating.) In squirrel cage motor, check also for loose or broken rotor bars.

E. IF ROTOR or armature is the wound type, check for loose banding. If any looseness is noted, band with new wire before putting motor back in service. If band assembly has not failed extensively — perhaps only a solder failure at one or two clips — repair can usually be effected simply by resoldering. Major rebanding, however, is a job for experts.

F. CHECK INSULATION — As motors get older, or as they operate continuously at high temperatures, insulation on coils tends to become brittle. It may start flaking off, cutting its insulating value. This may not affect motor performance seriously *except* that it may lead to short circuits or grounds, excessive vibration (out-of-balance rotor), or clogging of the air vents (leading to overheating) or abrasive wear from fallen particles. SO — check insulation visually . . . see whether pieces of insulation have torn or flaked off . . . and also make a megger (megohmeter) test. For a clean, dry motor at 75°C, insulation resistance in megohms, according to the American Standards Association, may be found by the formula:

$$\frac{\text{Rated voltage of motor}}{\frac{\text{Rating in KVA}}{100} + 1000} = \text{Insulation Resistance in Megohms}$$

G. CHECK BEARINGS — to remove ball bearings, use a puller, applying pressure to the inner race only, maintaining uniform pull all around, to avoid distorting the bore of the race.

Check bearings for excessive wear, scoring, or pitting.

To examine *anti-friction bearings,* first clean them thoroughly with kerosene to remove all old grease and dirt particles; then hold inner race and rotate outer race, feeling for roughness of action and listening for noise.

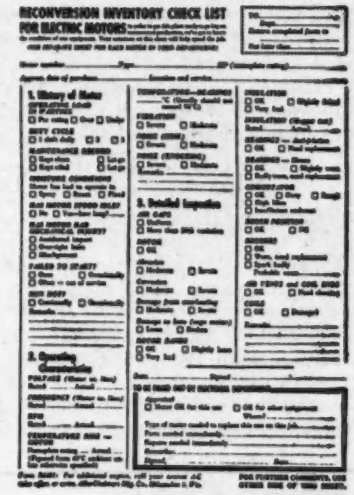
Inspect sleeve bearing clearance with feeler gauge. Normal clearances may be computed this way: take 0.003" as the basic tolerance . . . then add 0.001" for each inch of shaft journal diameter. Inspect journal surfaces; if scoring seems excessive, consider replacing.

If bearing shows no excessive wear, the hum of the motor in action may result from out-of-balance rotor or armature. Check this on parallel bars.

H. CHECK for cause of sparking. Check mechanical condition of parts. (For details, see Reconversion Inventory Kit, offered below.)

4 NOW MAKE THE APPRAISAL

With all the facts in hand — history, operating characteristics, condition of parts — your electrical department will be best prepared to assign this motor to its new role in reconverted production. Use check list forms like this —


RECONVERSION INVENTORY CHECK LIST FOR ELECTRIC MOTORS

for easy inspecting and appraising. Your nearby Allis-Chalmers district office or distributor will supply free copies of this Check List in whatever quantity you require.

CENTRIFUGAL PUMPS, V-BELT DRIVES, NEED INVENTORY TOO!

To speed your Reconversion Inventory of the most common industrial units, Allis-Chalmers has prepared a Reconversion Inventory Kit covering Electric Motors, Centrifugal Pumps, and V-Belt Drives. No big package, this kit is simply a set of Fact Sheets and Check Lists covering each type of unit, with suggestions for inventory procedure as outlined in these pages, but in somewhat greater detail.

A 1901

GET THESE FREE FORMS

For your supply of Reconversion Inventory Kits, covering motors, pumps, and v-belt drives, call your nearest Allis-Chalmers district office or distributor or write Dept. 418, ALLIS-CHALMERS MFG. CO., MILWAUKEE 1, WIS.

ALLIS AC CHALMERS

Yoerg Retires as President

HOLYOKE, Mass., October 6—Leon M. Yoerg, who has been president of the American Writing Paper Corporation for eight years after working his way up from a paper mill apprentice at the age of 13, today resigned as president because of ill health. Yoerg will, however, continue his association with that company as director and executive consultant. Thomas H. Blodgett will assume the office of president as well as his present post as chairman of the board and principal officer. Charles Southworth, then president of the Hampshire Paper Company, persuaded him to take up paper-making, and when he was 13, he started to work at the Hampshire Paper Company.

After 13 years with the Hampshire Company, he transferred to the Carew Manufacturing Company under the same management and became mill superintendent at the age of 26, one of the youngest superintendents in the country. He then became plant manager and resigned in 1923 to go with the American Writing as vice-president in charge of manufacturing and was there associated with Sidney L. Willson. He was made president in 1937.

Whiting Promotes Davidson

HOLYOKE, Mass., October 6—At a recent meeting of the board of directors of Whiting and Company, Inc., Charles Davidson, Jr., was elected vice-president of the company. He will at the same time continue his duties as general manager. Davidson started his paper-making career with the Neenah Paper Company, Neenah, Wis. From there he became associated with Strathmore Paper Company and later went to the Southworth Paper Company as superintendent.

Dutton Heads Tablet Makers

HOLYOKE, Mass., October 6—Harry Dutton, president of White and Wyckoff, was elected president of the Paper, Stationery and Tablet Manufacturers Association, at a meeting at the Edgewater Beach Hotel in Chicago last week.

He succeeds Donald R. Taber of this city, treasurer of American Pad and Paper Company.

Besides Dutton and Taber, Holyoke men attending the meeting included Constant Southworth of the Hampshire Paper Company, Leonard Pratt of Pratt and Austin, George Abelein of White and Wyckoff and Stuart Reynolds of the Reynolds Manufacturing Company.

Gypsum Buys Garwood Plant

BUFFALO, N. Y., October 6, 1945—National Gypsum Company has leased a paper mill and other real property at Garwood, N. J., from the Sonoco Products Company of Hartsville, S. C. Full control will be assumed by National Gypsum on January 1, 1946. The production of paper board for the company's own use will begin on this date.

This transaction will double National Gypsum Company's paper mill holdings. The other mill is located in Newburgh, N. Y.

Eric Lagerloef Joins A.P.P.A.

Eric Lagerloef, formerly of the Pulp and Paper Unit of the Bureau of Foreign and Domestic Commerce of the Department of Commerce has joined the staff of the American Paper and Pulp Association.

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Subsidiary and Affiliated Companies in England and Continental Europe

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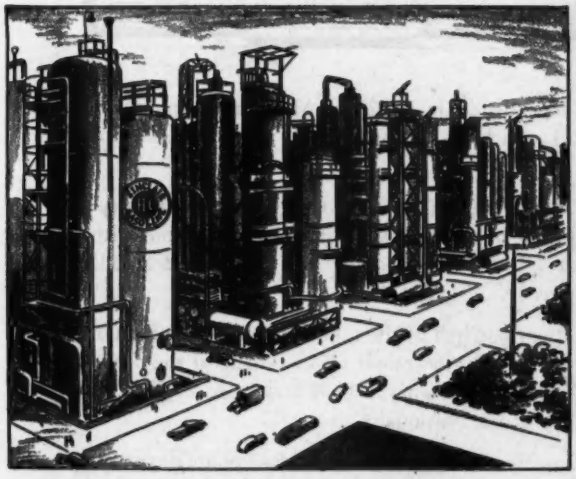
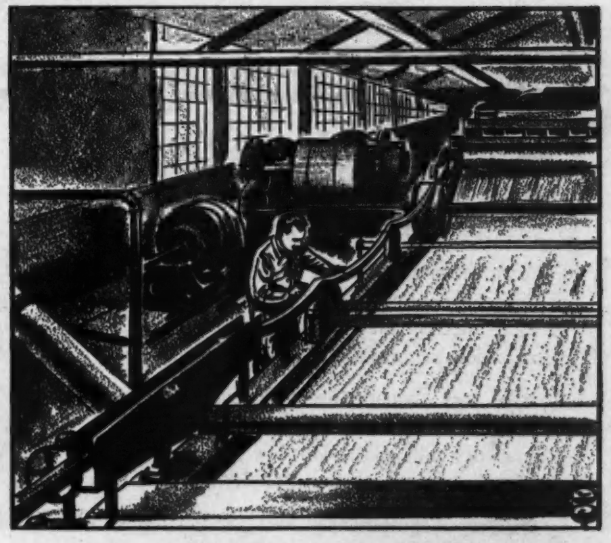
Do you know that . . .

A LINE OF DRUMS END TO END LONG ENOUGH TO REACH TWICE AROUND THE EARTH WOULD BE REQUIRED TO HOLD THE BILLIONS OF GALLONS OF SINCLAIR FUEL AND LUBRICANTS SOLD LAST YEAR.



SINCLAIR REFINERIES HAVE MANUFACTURED MILLIONS OF BARRELS OF 100-OCTANE GASOLINE FOR THE ARMED FORCES. SINCLAIR AVIATION GASOLINE WILL AID FLYING ON NATIONAL AND INTERNATIONAL ROUTES.



SINCLAIR SPECIALIZED OILS AND GREASES ASSURE ADEQUATE LUBRICATION UNDER CONTINUOUS HEAVY DUTY SERVICE . . . SINCLAIR STEAM CYLINDER AND VALVE OILS MEET ALL OPERATING CONDITIONS.

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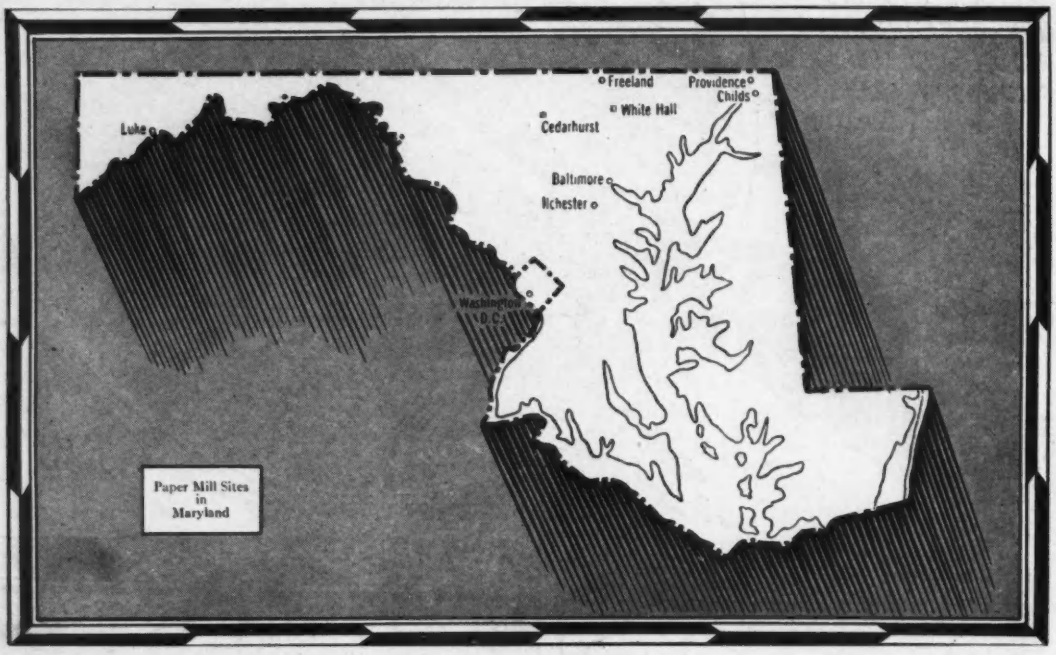
Draper's

ATLAS OF AMERICAN PAPERMAKING

No. 11 PUBLISHED BY DRAPER BROTHERS COMPANY • CANTON, MASSACHUSETTS



While the ink was still fresh on the Declaration of Independence, in 1776, the Maryland Convention recognized the importance of paper by advancing to one James Dorsett four hundred pounds sterling for the establishment of the first paper mill in the State.

After the civil war there was a boom in papermaking in Maryland, and as late as 1886, there were twenty-nine mills in operation, few of which, however, were large. The number has since shrunk to eight, but with more modern machinery, production has reached about 162,000 tons annually, and Maryland stands twentieth among the States in the volume of paper produced.

Book paper constitutes the largest item, accounting for about one half of the total, and the production of paperboard is a close second, kraft corrugating coming third. Mention might also be made of the single specialty mill in the District of Columbia, originally Washington County, which was ceded in 1788 by Maryland to the Federal Government, to become the site of the National Capitol.

Paper mill equipment in Maryland includes 13 Fourdriniers, 9 cylinder machines, and 5 sulphate digestors.

Draper Felts for Efficiency

DRAPER BROTHERS COMPANY

Woolen Manufacturers Since 1856

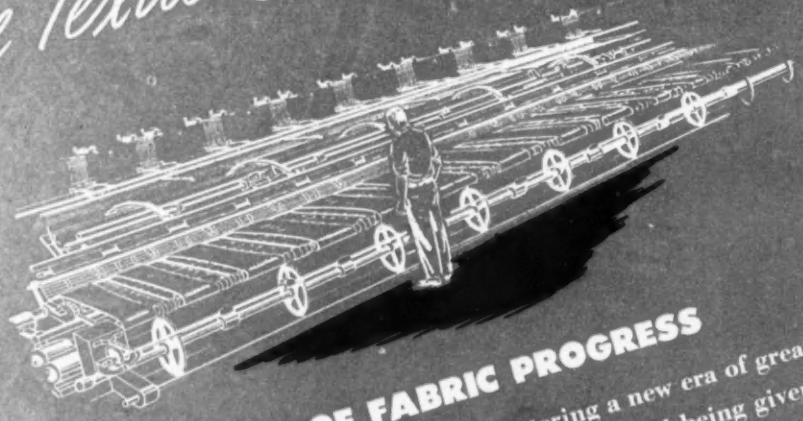
Canton, Massachusetts

RALPH E. BRIGGS Sales Manager

BRADFORD WEST PITTSFIELD, MASS. • WILLIAM N. CONNOR Jr CANTON, MASS. • L. H. BREYFOGLE KALAMAZOO, MICH. • CHAS. E. BERTSCHY MILWAUKEE, WIS. • W. L. CAMPBELL SAVANNAH, GA. • BALFOUR GUTHRIE & CO. Ltd. PACIFIC COAST

ADVENTURES IN THE "MARGIN OF EXPERIENCE"

The Textile Industry



ARCHITECT OF FABRIC PROGRESS

The textile industry is now entering a new era of great promise. Not only are the traditional materials such as cotton and wool being given remarkable new qualities but entirely new yarns and fabrics are being "created" in whole cloth by those architects of fibres . . . the textile chemists. As a result, textiles are performing many functions and solving many problems where their use had never been considered before. It is possible, for instance, to produce a fabric today that would resist fire, salt water, mildew, moths, perspiration, decay—and at the same time have a finer appearance and take dyes better.

These developments are rising out of that wide "Margin of Experience" which the textile industry has been building up for many years. It is a similar "Margin of Experience" in the field of electro-chemicals, which enables Niagara Alkali Company to give constantly improving service to the industries that use its products.

Niagara ALKALI COMPANY

60 EAST 42ND STREET, NEW YORK 17, N. Y.

Caustic Potash • Caustic Soda • Paradichlorobenzene
Carbonate of Potash • Liquid Chlorine • Nitrol

Tension Without Friction

PLAINFIELD, N. J., Oct 6, 1945—A new system of handling paper in rolls, which uses pneumatic pressure to achieve "Tension without Friction," is revealed with the announcement by Wood Newspaper Machinery Corporation, of its "Running-Belt Tension," first step in the company's broad post-war program. The running-belt tension is applicable wherever paper is fed at high speed from rolls, not only in magazine and newspaper publishing, but also in paper mill operation, packaging, wall paper, wrappers and labels ,and other allied industries.

According to Oscar C. Roesen, Pres. of the Wood company, a set of parallel continuous belts, driven by the press and running with the roll, maintains, for the first time, a uniform web tension, regardless of variations in press speed, size and position of roll, or other changing factors.

The desired tension is pre-selected and manually set, at the start of each run, during which it can be adjusted by remote control from pressman level. From then on, the action is fully automatic. Air pressure, controlled by a floating roller, responds instantly to correct any tendency toward change in tension.

The Wood running-belt tension protects delicate stock by maintaining the correct tension at all speeds with minimum friction, therefore, preventing injury to the surface of the web. It relieves the operator of an arduous responsibility, and eliminates the slackness and buckles that cause misregister. It may be installed on all Wood reels and most existing reels of other makes. Used in conjunction with Wood autopasters, it constitutes a method of achieving perfect flying splices for high-speed continuous output. By feeding the web at the threading-in speed, it achieves important time-savings. In case of a web break, the red Button stop on the press, automatically converts the running belt into a powerful braking action.

McPherson Back from Navy

GREENVILLE, S. C., Oct. 6, 1945—The office of John A. McPherson Company announces that G. Bruce McPherson has been released from the U. S. Navy and has returned to this company, of which he is a member of the firm. He was a Lieutenant in the 8th Special U. S. Naval Construction Battalion and served as executive officer. While in Service, Lieutenant McPherson served thirty months in the Aleutians and on the West Coast.

Swedish Pulp Imports

WASHINGTON, D. C., Oct. 4, 1945—Imports of wood pulp into the United States from overseas totaled 25,144 short tons during the week ended September 27, 1945, the Pulp and Paper Unit, Department of Commerce, reported today.

The aggregate quantity of wood pulp imported from overseas sources since the first post-war importations were reported for the week ended June 29, 1945 through September 27, 1945, amounts to 190,399 short tons. This tonnage was composed of about 43 percent unbleached sulphite wood pulp, about 41 percent unbleached sulphate wood pulp (kraft), and about 7 percent of bleached sulphite grades other than high alpha and dissolving. The remaining 9 percent was mechanical pulp, bleached sulphate, special chemical grades of bleached sulphite, and soda pulp.

Campbell Returns

FITCHBURG, MASS., Oct. 6, 1945—R. H. Campbell, one of the associates of Linton Brothers & Company, and for many years prominently identified with that concern, has just been relieved from active duty and has returned to Linton Brothers & Company.

A reserve officer since the last war, he was called into the Service in August, 1942. He is a major AUS, and most of the time served as the executive officer of George Field, Lawrenceville, Illinois; though for the past few months since the closing of that field for active training he has been engaged in Contract Negotiation and Termination in New York State.

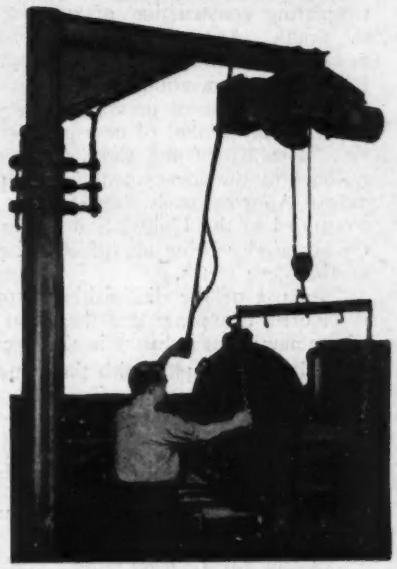
Major Campbell is a veteran of the 1st World War, and is the possessor of the Silver Star and five battle stars.

A-C Promotes Landreth

MILWAUKEE, WIS., Oct. 6, 1945—Mr. R. N. Landreth has been appointed assistant to the vice-president of the general machinery division of the Allis-Chalmers Mfg. Co., according to a recent announcement by W. C. Johnson, vice-president. Mr. Landreth, who has been special representative for the company, will continue to reside in Washington, D. C., and will function on assignments from Milwaukee.

Associated with the American Brown-Boveri Electric Corporation when it was acquired by Allis-Chalmers in 1931, he joined the Allischalmers organization to serve in the Milwaukee sales office and the electrical department.

360° JIB HOIST SPEEDS PROCESSING



Here's a materials handling problem that was solved by a Reading Electric Hoist with a 360° swing jib crane. Large quantities of metal turnings were processed for oil removal. Speedy handling was necessary.

A Reading Electric Hoist was selected for power and hoisting speed. Reading engineers also designed the 360° swing for the crane to speed up loading and unloading.

For help in materials handling problems that involve hoisting, write for bulletin, "144 Answers To Your Hoisting Problems".

READING CHAIN & BLOCK CORP.
2113 ADAMS STREET READING, PA.

READING HOISTS

SNPA Expects Boom in Southern Mills

ROANOKE, Va., Oct. 7—Plans are under consideration for doubling the capacity of the newsprint mill at Lufkin, Tex., at a cost of $3,000,000 to $5,000,000 and several large financial groups are contemplating construction of new newsprint mills in the South. According to Carl B. Short of Roanoke, newly elected president of the Southern Newspaper Publishers Association.

One of the most pressing problems facing newspapers today is that of newsprint supply, he pointed out. Because of the shortage, newsprint has been rationed by the government for the past two years or more. Approximately three-fourths of the newsprint consumed in the United States comes from Canada, the remainder being manufactured principally in the northeastern states.

"Because of the diminishing supply of timber in the North, it appears that there can be no expansion of the newsprint industry in that section," Short said.

"This fact, coupled with the contemplated increase in the demand for newsprint, has turned attention to the South, where vast pine forests are available for the manufacture of newsprint. More than a year ago the SNPA began having surveys made of the southern forest areas, looking to the establishment of additional newsprint mills in various sections of the South.

"In the favorable southern climate, by scientific forestry practices, the pine forests will replenish themselves at a sufficient rate to insure perpetual supply of wood for the manufacture of many hundreds of thousands of tons of newsprint per year.

"Several large financial groups already have under consideration the construction of a number of newsprint mills in several southern states, including Mississippi, Texas, Alabama, Georgia and Florida. For obvious reasons they will make no announcement until their plans are complete.

"In 1941," Mr. Short continued, "the daily newspapers in 14 Southern states consumed 400,000 tons of newsprint. We hope eventually the South will be producing all the newsprint its newspapers can consume. The SNPA, in addition to encouraging new paper mills, also is encouraging tree farming and conservation of the South's forests."

Mr. Short pointed out that the Lufkin mill, known as the Southland Mills, Inc., was promoted and partly financed by members of the SNPA.

Mr. Short, who is general manager of the Roanoke Times and the World News, assumed his duties as president of the SNPA on October 1.

St. Joseph's Opens for Third Year

PHILADELPHIA, Pa., October 8, 1945—St. Joseph's College evening school of paper making for men and women employed by the paper and allied industries, opens its classes October 15. Fifteen courses are offered. This school has been organized in response to many requests from the men and women who attended courses on paper making during the last two years. The curriculum has been planned with the active collaboration of paper specialists and all technical courses of the program will be taught by men now employed by the paper industry in responsible positions. Classes meet two evenings a week from 7 to 10 p. m. at the college, 54th and City Line.

SILVER ANNIVERSARY

OCTOBER 1945

On this occasion of our 25th birthday we extend heartfelt thanks to our many friends and sources of supply whose understanding and cooperation have contributed to our growth. We look forward to continuing our close and cordial relationship for many years to come.

THE ACE PAPER CO., INC.

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NOW...

Bulking facilities for all type latices at AMERICAN ANODE plant

One of the new 11,000-gallon storage tanks arriving at American Anode's Akron plant.

Large volume requirements can be handled quickly . . . safely

Additional advantages of American Anode's new bulk storage facilities are:

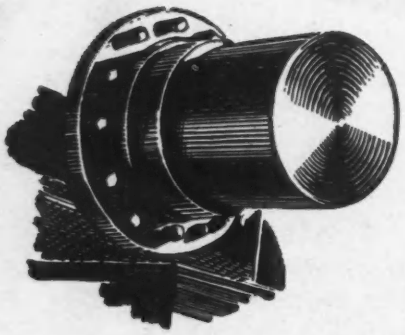
1. **Positive uniformity of quality . . . an entire shipment made from one lot of latex . . . better winter protection . . . insured maintenance of pH.**
2. ***All* types latices immediately available . . . natural rubber, GR-S, Hycar, Geon, Neoprene . . . enable us to give you exactly what you need for your finished product.**
3. **Better service . . . due to reduced time lag in filling orders.**

Add to these the processing, economy, and safety advantages of using American Anode water dispersions for coating, impregnating, and cementing . . . add the experience with these materials that American Anode has gained over a period of many years' pioneering . . . then let our research staff work with you to determine how you can most effectively use this new service. For more information please write American Anode, Inc., 60 Cherry Street, Akron, Ohio.

AMERICAN ANODE
INCORPORATED

NATURAL AND SYNTHETIC RUBBER LATICES, WATER CEMENTS AND SUSPENSIONS

Today's Production Whirlwind calls



Bearings run as cool as a spring breeze after changing to

TYCOL GREEN CAST GREASES

There was a time when overheated bearings raised havoc with a large plant's production schedules. But now this trouble seems like a bad dream, so cool do bearings run, now that they are lubricated with Tycol Green Cast Greases.

Here is the reason for the excellent results this, and hundreds of other plants get when they change to Tycol. Tycol Green Cast Greases are made from the finest cylinder oil combined with a *minimum* of soap — more lubricating oil, less soap, equals more economical lubrication. Tycol Green Cast Grease is water repellent . . . scientifically engineered to "take it" indoors and out.

Let us help you maintain maximum production by proper lubrication. Have a Tide Water Associated engineer give you full details.

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ENGINEERED FOR EVERY

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ENGINEERED LUBRICATION

Now more than ever before it is essential to use the best lubricants that can be obtained — for maximum production . . . top efficiency . . . lowest operating cost. That's why more and more operators are turning to Tycol scientifically engineered oils and greases.

Whatever your lubricating need — for mine car or tipple, textile loom or spindle, stationary Diesel or locomotive, steam engine or turbine . . . for extreme pressure, high or low temperature, heavy duty, high speed, or any other service condition — there's a Tycol oil or grease exactly suited to your specific need.

In developing this comprehensive line, Tycol subjects each individual oil and grease to rigid tests during manufacture. This control assures the required lubrication characteristics for maximum performance of that particular product.

Let us prove Tycol Engineered Lubrication efficiency to you . . . show you the extra value in every measure of Tycol oil and grease. Write your nearest Tide Water Associated office for the facts.

***SPECIFIC GRAVITY.** Clear, concise descriptions of the basic tests used to determine important lubrication properties — Carbon Residue, Pour Points, Specific Gravity and others — are given in Tide Water Associated "Lubricania". For your FREE copy write: Tide Water Associated Oil Company, 17 Battery Place, New York 4, N. Y.

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Chicago Market Is Awaiting OPA Decisions

New Expected Pricing Plan On Various Weights of Paper Hoped For Soon To End Uncertainty In Post-War Trade — Waste Paper Salvaging Falls — Paper Men Back Fund Drive — Other News.

CHICAGO, Ill., October 8, 1945—The Chicago paper market, confronted with a printers strike which is having a direct effect on the jobbing trade in this area, is trying to estimate how long it will actually be before pulp will come to a sufficiently normal status to plan "normal" operations. The consensus of opinion here is that such normalcy will not come this winter and that it will be far into 1946 before planning of a normal character can take place. Meanwhile, the OPA program on the pricing of various weights of paper is continuing to perplex the local trade and there is strong hope that the recommendations of the Advisory Committee as to the variances in ceilings will ultimately be accepted—the sooner the better.

Waste paper sources here are concerned over the lack of interest in salvage and over the reportedly pronounced falling off in collections. In some quarters it is felt that organized salvage efforts should not have been discontinued because of the extension of war-time needs far into the peace time program. As the "professional" pick-ups decline or at least mark time, it is expected that more and more demand will be made for at least a partial return of the organized salvage and pickup program through the schools, Scouts and other agencies. Mills in this area are said to be very short on supply with inventories down to nothing and a tremendously big foreign shipping and local demand still to meet.

Paper Industry Important in Fund Drive

One hundred and twelve representatives of Chicago's paper trade this week began the unselfish and important job of carrying the story of the Community War Fund Campaign to Chicago's paper industry. The entire ambitious program to raise millions of dollars has taken on a direct paper "complexion" with the Container Corporation of America, in particular, lending much of its manpower to make it a success. Walter Paepcke, Container Corporation's Chairman of the Board, is general chairman of the drive. James C. Cunningham, Container vice-president, is vice chairman while H. W. Gellersted, sales manager of the box board division of Container, is the Chairman of the Paper Group.

This year the job is to be done through "company campaign chairmen and sub-chairmen" rather than through divisions of the trade as in the past. There are about one hundred chairmen and sub-chairmen who will comb the major paper industries in the area to give the campaign a "company" competitive stimulus. The drive is expected to wind up prior to the holidays—and with so many paper trade executives manning it (one of the largest of all groups in personnel) it seems assured of success.

Salesmen Hold Discussion Sessions

The western division of the Salesmen's Association of the Paper Industry has no member-guest open meetings in sight yet but Pat Patterson, Flambeau Paper Company sales executive and vice president of the western division, expects to shortly announce an outstanding speaker for the first or second week in November if not earlier. Meanwhile, the SAPEYES are concentrating on the Monday noon sessions at the Sherman Hotel and have foregone, again, any participation in the weekly Wailing Wall football luncheons in order that they may concentrate on business and on a valuable discussion of current conditions within the industry. Most of the SAPEYES like the idea of participating in the weekly football round-up, but they're agreed that an interchange of information on current conditions is far more helpful.

New Albemarle Sales Representative

Fred Roll, recently discharged from the armed forces, is now sales representative of the Albermarle Paper Company for the Chicago area. Offices of the company are at 400 W. Madison street, the "Daily News" building. The company has not been represented by an official sales representative for about two years, according to reports, with officials from the factory dropping in to handle matters as they come up. Mr. Roll's appointment obviously is the opening gun of Albermarle's peace time distribution program in this area.

Masonite To Spend Million on Plant

CHICAGO, Oct. 3, 1945—To meet the increased postwar demand for Masonite products, the board of directors of the Masonite Corporation today approved an expenditure of over a million dollars for expanding the facilities of its plant at Laurel, Miss. ,according to M. P. McCullough, president.

"When complete, the additional facilities will increase production of Masonite Presdwoods by more than 30 per cent," Mr. McCullough stated. "Capacity will also be greatly enlarged for tempering the Presdwoods."

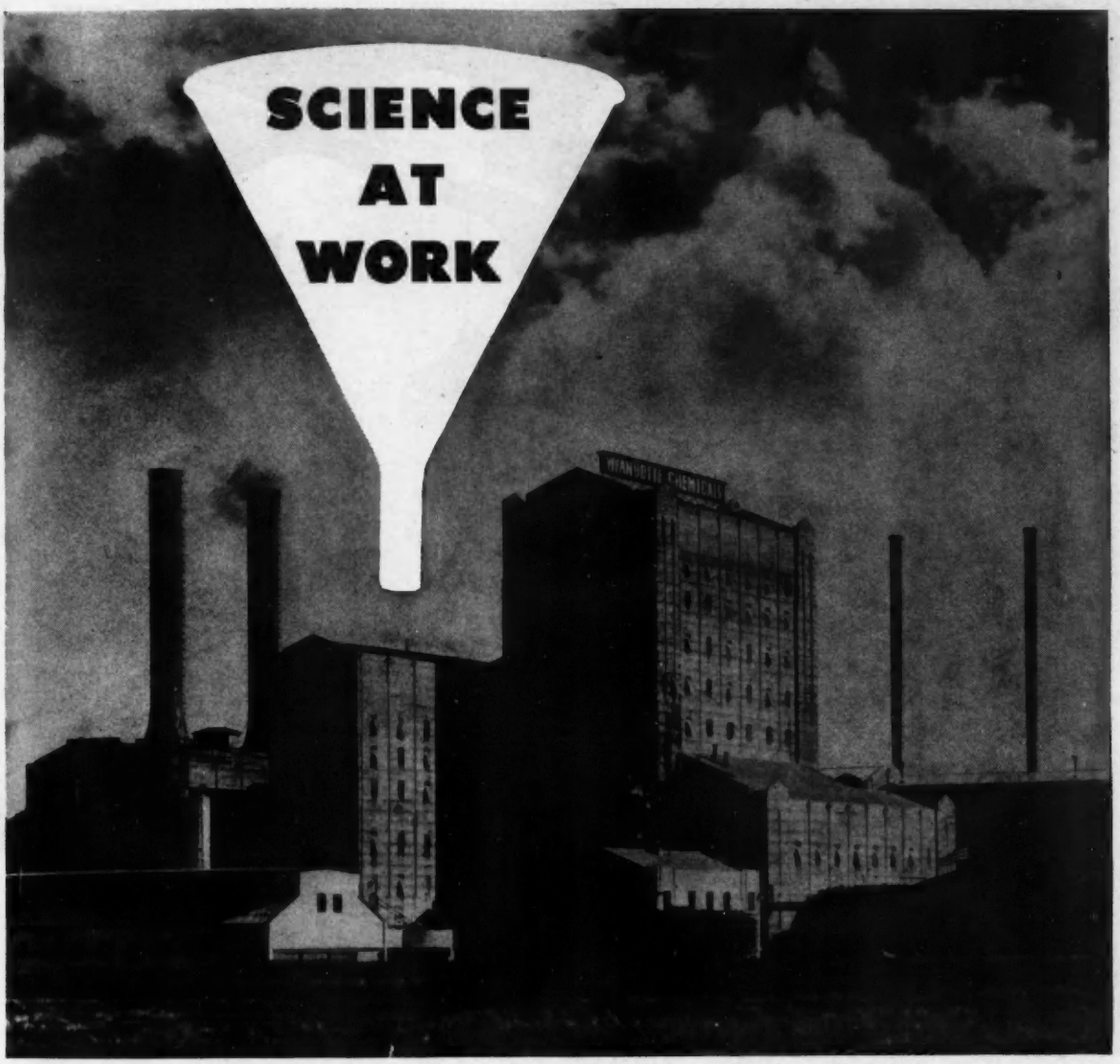
The Board of Directors prepared for the financing of this addition more than a year ago, when the sale of 62,000 shares of Masonite common stock was authorized and the proceeds placed in escrow for this one purpose.

Michigan Superintendents Meet Oct. 18

KALAMAZOO, Mich., October 5, 1945—The next meeting of the American Pulp and Paper Mill Superintendents Association, Michigan Division, will be held Thursday, October 18th, at the Park American Hotel. Dinner will be served at 6:30 p. m. Vance Verlandingham representing the Kelco Company of Chicago, Ill., will discuss and demonstrate the evaluation of size and oil penetration on paper and board.

Welch Resigns As Manager

ROCKLAND, Del., October 1, 1945—W. E. Welch who has been manager of the Rockland Division of San-Nap-Pak Mfg. Company, Inc., for several years, has resigned. Mr. Welch is well known throughout the paper industry, starting his career in 1920 with The Jessup & Moore Paper Co., and has been manager of San-Nap-Pak Mfg. Co. since 1938.



Part of North Plant, Wyandotte Chemicals Corporation, Wyandotte, Michigan, equal in height to an 18-story building. Here are produced three of the Wyandotte chemicals that meet the exacting requirements of American industry.

WYANDOTTE CHEMICALS CORPORATION

ONE OF THE WORLD'S GREAT PRODUCERS OF CHEMICALS

SODA ASH
CAUSTIC SODA
BICARBONATE OF SODA
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CHLORINE
HYDROGEN
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AROMATIC INTERMEDIATES
DRY ICE
OTHER ORGANIC AND INORGANIC CHEMICALS

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MICHIGAN ALKALI DIVISION • WYANDOTTE, MICHIGAN

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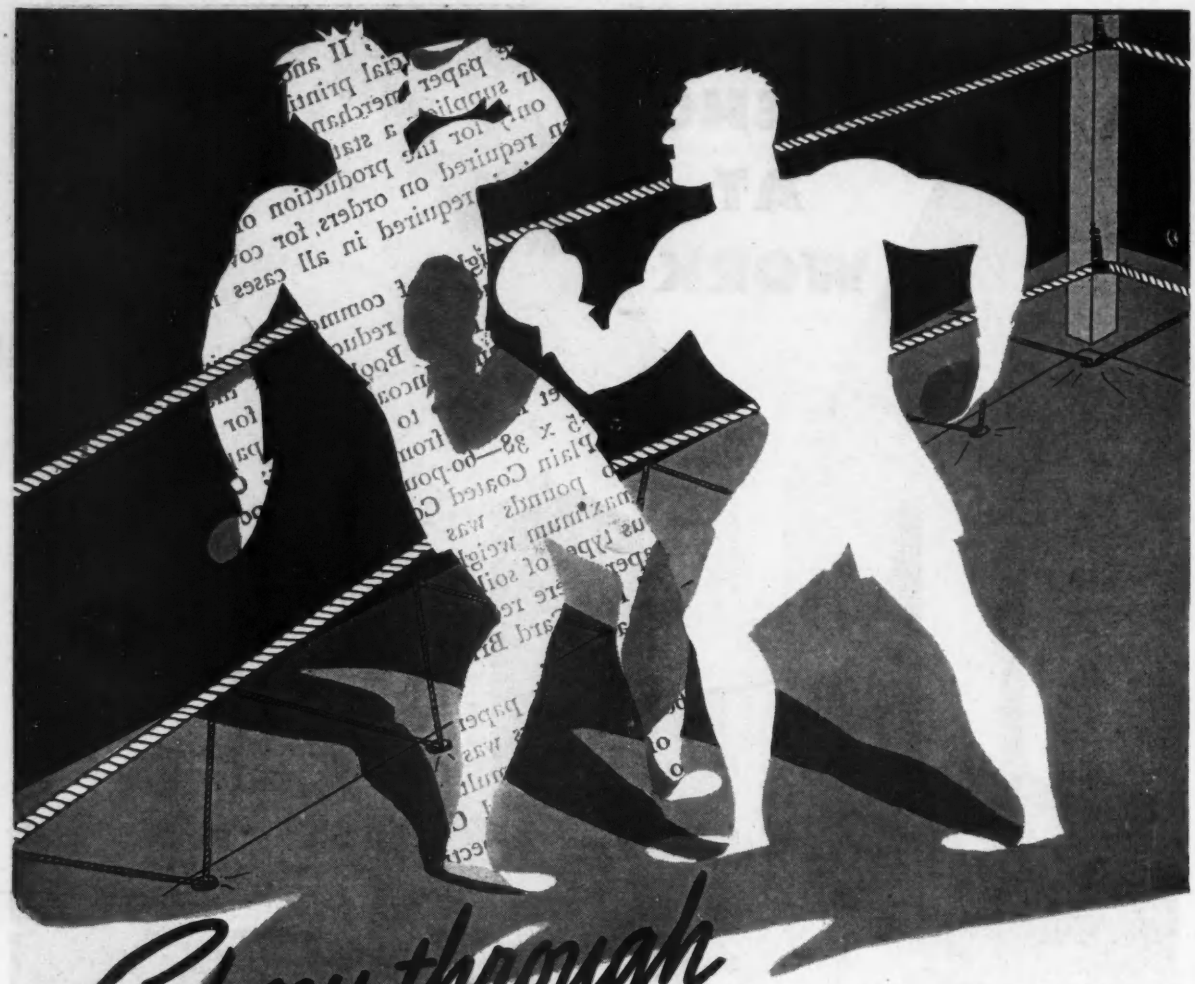

Show-through IS ON THE ROPES

Opacity, built up by TITANOX, is really giving show-through a thorough going over.

Throughout the paper-making industry TITANOX pigments are today recognized as the unequivocal answer to opacity in papers of every kind. Add to this their contribution of unequalled whiteness and brightness . . . and the fine printing surfaces resulting from their use and you have the answer to quality . . . quality which from now on will be the watchword among paper buyers everywhere.

Put TITANOX pigments on your list of "must" ingredients and you will be on the right road to success in the keen competition ahead.

We invite technical inquiry.

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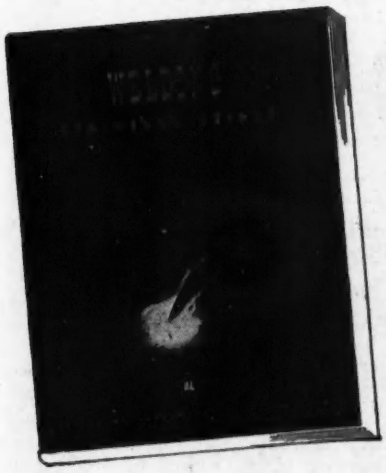
TITANOX
REG U. S PAT OFF

ARE YOU WELDING STAINLESS STEEL?
HERE'S *New Light* ON THE SUBJECT



This book can save you time and avoid spoilage of vital alloys, both more than ever essential to the war program today. Describes and illustrates equipment, procedures, precautions. Request copies on your company letterhead, please.

ADDRESS DEPT. PT-35

SUCCESSFUL stainless steel welding, as many a shop has found out the hard way, puts a premium not only on knowing what to do, but also what to avoid doing—and why.

That is because the problem, first of all, is a double one as compared to ordinary carbon steel welding, since it calls for maintaining the corrosion resistance of the parent metal across the weld area, as well as its strength. Furthermore, although stainless steel welds easily, the various members of the stainless family differ considerably from carbon steel—and even from each other—in the physical and chemical phenomena they exhibit during the welding process.

Information, clear and complete, is the basic answer. We've supplied it in a new 64-page, full-color booklet, *"Welding Stainless Steels,"* covering all the commonly-used hand or machine methods of welding Allegheny Metal. Employing a new idea in graphic illustration, this book is, we believe, the most complete and understandable coverage of the subject yet published—a welding shop "bible" purposely made so clear and simple that it is also ideal for student training. ● *Write for your copy (see at left).*

Allegheny Ludlum
STEEL CORPORATION
BRACKENRIDGE, PENNSYLVANIA

Branch Offices in Principal Cities . . . Allegheny Metal also handled by all Joseph T. Ryerson & Sons, Inc. Warehouses

A-9078 . . . W&D

BAUER PULPER INSTALLATIONS

Produce long, pliable, free fiber. From many different raw material sources for almost every grade of finished output. The tabulation of actual mill applications below will interest you—give you a clear picture of the range of stocks being successfully pulped with Bauer equipment.

Raw Chips from Logs or from Wood Waste, Slabs, Edgings, Tree Tops, Veneer Waste.

Steamed Chips.
Semi-Chemically Cooked Chips.

Extracted Chestnut Chips.
Extracted Pine Stump Chips.

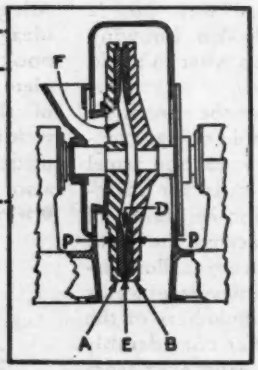
Groundwood Bull Screen Rejects
Groundwood Knotter Screen Rejects
Groundwood Fine Screen Rejects

Kraft Knotter Rejects
Kraft Screen Rejects

Sulphite Screen Rejects

Waste Printed Papers; Ledgers
Waste Wet Strength Papers
Waste Corrugated Papers
Waste Papers in General

Bagasse Fiber
Licorice Root Fiber
Bamboo Fiber



Stock enters at F; passes between plates PP, positioned between disks A and B . . . and is discharged at E.

THE **BAUER BROS.** CO.
SPRINGFIELD, OHIO

Bauer Pulpers are in service in: The United States, Canada, Mexico, Hawaii, New Zealand, Australia, India, Sweden and Russia.

ARMY E NAVY
Bauer

FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending October 6, 1945

STOCKS

	High	Low	Last
A. P. W.	7	6¾	6⅞
Armstrong Cork Co.	54½	53⅜	54
Celotex Corp.	21	19¾	20⅛
Celotex Corp., pf.	21¾	21⅛	21¼
Certain-Teed Products Corp.	15⅜	14⅜	14⅝
Certain-Teed Products Corp., pf.	110	109	110
Champion Paper & Fibre Co.	45½	44⅛	44⅜
Champion Paper & Fibre Co., pf.	109½	109	109½
Congoleum Nairn Co.	39½	37½	37½
Container Corp. of America	33⅞	33¼	33¾
Continental-Diamond Fibre Co.	14⅝	13⅝	13⅞
Crown-Zellerbach Co.	27½	26⅝	27½
Crown-Zellerbach Co., pf.	106½	105	105⅝
Dixie Cup Co.	34⅛	33½	33¾
Dixie Cup Co.,—A	48¾	47⅜	47⅞
Flintkote Co.	33⅜	32½	32½
Flintkote Co., pf.	109½	108¾	108¾
Robert Gair	7⅜	7⅜	7½
Robert Gair, pf.	19	18⅝	19
International Paper Co.	34⅜	32¾	33¼
International Paper Co., pf.	105	103½	104⅞
Johns-Manville Corp.	144⅛	140	142
Johns-Manville Corp., pf.	131½	131	131½
Kimberly-Clark Corp.	53½	52⅞	53½
Mac Andrews & Forbes	...	...	...
Mac Andrews & Forbes, pf.	...	...	...
Masonite Corp.	49⅜	47½	47¾
Mead Corp.	20¼	17⅞	19⅞
Mead Corp., pf. —6%	107	107	107
Mead Corp., pf. B—5½%	106	104½	106
National Container Corp.	20½	19	20¼
Paraffine Companies, Inc.	73	72¾	72¾
Paraffine Companies, Inc., pf.	...	...	...
Rayonier, Inc.	23⅞	23	23⅞
Rayonier, Inc., pf.	37½	37	37
Ruberoid Co.	44	42¼	44
Scott Paper Co.	56½	55	55¾
Scott Paper Co., pf.	...	...	...
Sutherland Paper Co.	39½	38⅝	39½
Union Bag & Paper Corp.	22	20⅝	21⅞
United Paperboard Co.	8	7¾	7⅞
U. S. Gypsum Co.	107¾	100	103½
U. S. Gypsum Co., pf.	195	195	195
West Virginia Pulp & Paper Co.	34½	32¾	34½
West Virginia Pulp & Paper Co., pf.	111	111	111

BONDS

Abitibi Pulp & Paper Co. 5s '55	108	108	108
Celotex Corp. 3¾s '55	...	...	...
Certain-Teed Products Corp. 5½s '53	...	...	...
Champion Paper & Fibre Co. 4¾s '50	...	...	...
International Paper Co. 6s '55	109	108⅞	109
International Paper Co. 5s '47	103¾	103¾	103¾
Mead Corp. 3½s '53	...	...	...

New York Curb Exchange

High, Low and Last for Week Ending October 6, 1945

STOCKS

	High	Low	Last
Great Northern Paper Co.	46¾	41	45
Hummel-Ross Fibre Corp.	10½	10	10
St. Regis Paper Co.	8⅛	7⅞	8⅛
St. Regis Paper Co., pf.	...	...	...
Taggart Corp.	7⅞	7½	7⅞

BONDS

American Writing Paper Co. 6s '61	...	...	...

Donnacona Co. Plans Refinancing

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., October 10, 1945—It is reported in the papers here that preliminary discussions of refinancing by the Donnacona Paper Company, of Donnacona, Que., are taking place.

In bond circles it is stated that the company may be able to effect a saving of about 1% by refunding the $5,350,000 of 4½% first mortgage sinking fund bonds due February 1, 1956 (interest on which is payable in Canadian or U. S. funds, or sterling), partly in domestic financing so that part of the savings in interest charges might be in eliminating exchange on U. S. funds.

Champion Nets 53 Cents

The Champion Paper and Fibre Company and subsidiaries for the sixteen weeks to August 19, reports a net profit of $527,044, equal to 53 cents each on 546,000 common shares.

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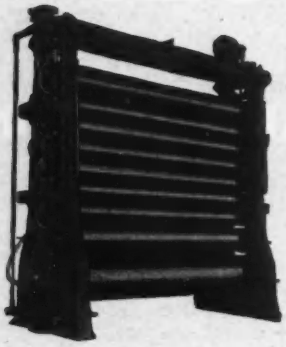

Constant study and development is back of the design and construction of Lobdell machine-calender stacks. These stacks have proved their accuracy . . . they are the choice of leading modern paper mills because—

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(2) keep maintenance cost down

(3) give uniformly fine paper finish, and

(4) produce maximum output in minimum time

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Scott Ready to Open at Ft. Edward

FORT EDWARD, N. Y., Oct. 6, 1945—The Scott Paper Company will open its local branch manufacturing plant late this month in what is probably the largest expansion project ever launched by the firm. The company recently acquired the abandoned mill of the International Paper Co. through its subsidiary, the Marinette Paper Co., as the site for a new Scott enterprise and it is expected that employment will be furnished several hundred persons. John B. Hay, of Chester, Pa., who has been named general manager of both the Glens Falls and Fort Edwards plants, stated that operations at the former city will not be affected by the new plant.

Among the products to be manufactured are paper towels, wax paper, toilet tissue and facial tissue. Production will be gradually increased from the start until the entire plant is running. The company purchased the International mill early this year but did not begin renovations to buildings and equipment until July. The repairs are now in the final stages and the entire structure has been thoroughly modernized in order to obtain the maximum production.

The mill includes a number of buildings of various sizes which are arranged in such a manner as to allow manufacture of the different products without any difficulty. Francis O. Boylon has been named superintendent of production at the new plant and Henry Fales as plant engineer. The task of recruiting a force for the new plant is now under way and the inducements offered are attracting attention from workers in neighboring paper mill towns.

Labor Shortage Hits Wisconsin Rapids

WISCONSIN RAPIDS, September 29, 1945—A higher level of general employment and a shortage of skilled tradesmen dominate the postwar economic scene in Wisconsin Rapids and the surrounding area. Industry in this locality slid into the national defense effort with a minimum of changeovers and now is diverting its products into peacetime channels with little or no reconversion headaches.

The Consolidated Water Power and Paper Company and the Nekoosa-Edwards Paper Company already have launched big expansion projects and the Prentiss Wavers Products Company, engaged principally in the manufacture of stoves, is constructing a large warehouse.

One of the major items on the peacetime agenda is the streamlining of the Wisconsin Rapids business district on the east side of the Wisconsin river. The Consolidated firm has purchased mercantile buildings lining the river bank and is presenting the property to the city for park purposes. Old structures, including the well-known Witter hotel, will be dismantled and the various occupants will build anew in different locations.

Kassing Joins Syracuse Faculty

SYRACUSE, N. Y., October 1, 1945—Burton L. Kassing, for the past twelve years paper mill superintendent of the Hammermill Paper Company, Erie, Pa., has resigned from this position to accept a professorship in the Department of Pulp and Paper Manufacture at the New York State College of Forestry, Syracuse University. He will succeed W. Oury Hisey who resigned to undertake consulting work in the paper industry at Johannesburg, South Africa.

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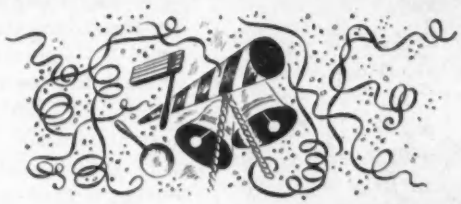

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In simplest terms, this means that this most versatile — *under certain conditions most powerful and under other specific conditions most gentle* — oxidizing agent yet developed is available *now*. To many phases of American industry and to hundreds of communities beset with taste and odor problems in their water supply systems — this announcement will be of outstanding significance.

The adoption of Sodium Chlorite and Chlorine Dioxide in the technique of bleaching is certain to result in improved quality of many products now bleached by older methods. Textiles — cotton, rayon, and nylon . . . paper products of all kinds . . . edible and inedible oils . . . shellacs and varnishes . . . even beeswax and straw products, can be bleached *whiter* than ever before with an absolute minimum change of chemical and physical characteristics through the use of Sodium Chlorite. And Mathieson's research staff is still developing more and more uses for this greatest of oxidizing agents!

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PAPER
TRADE JOURNAL
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PAPER SUPPLY RISING

With the removal of many governmental regulations and controls in the production of paper and paper products, the industry is better prepared to operate in the early post-war period. OPA prices are a deterring factor in many instances but relief already granted and in prospect through the upward revision of prices, indicates that the pricing agency is prepared to take action on any "price squeezes" that hamper trade activities.

A more freely flowing volume of domestic and foreign trade is steadily, if somewhat slowly, developing.

Production of paper of all types for July aggregated 1,349,000 tons, compared with 1,447,000 tons in June, and with 1,326,000 tons in July, 1944. The output for the first seven months of 1945, totaling 10,960,000 tons, compares with 9,947,000 tons in the same period in 1944, an increase of 10.1%. In congratulating the paper industry for its cooperation and production established during the war, the report of J. A. Krug, chairman of the War Production Board, provides the following production data: Paper and paperboard production in the first half of 1945, amounted to 8,710,224 tons, in comparison with the following full years: 1944, 17,182,804 tons; 1943, 17,035,688 tons; 1942, 17,083,862 tons; 1941, 17,762,365 tons; 1940, 14,483,709 tons; 1939, 13,509,642 tons, and in 1938, 11,380,814 tons.

Current production data indicates the output of most types of paper and paper products increased in July, with some important declines. The computation on a seven month basis follows: newsprint output increased 2.7%; groundwood, 5.6%; fine papers, 3.6%; coarse wrapping, bag and converting papers, 1.8%; shipping sack, 4.9%; sanitary, 0.4%. Declining output is indicated in book papers, off 1.7%; special industrial, off 2.1%; tissue, off 6.5%; absorbent, off 1.9%, and building papers off 1.7%. In the seven months of 1945, over-all domestic paperboard production aggregating 5,198,000 tons, rose 1.2%, with the following changes in the major grades; containerboard up 0.2%; folding boxboard up 6.4%; building board up 2.7% and miscellaneous and tube stock up 1.1%.

Newsprint production is so far below requirements in Europe that government commitments will probably necessitate the retention of Order L-240, controlling consumption, for some months. Newsprint as defined in the amended order of September 1, 1945, refers to the grades of print paper known as "standard" and "superstandard." Under this amendment, magazine publishers and commercial printers may use in any calendar quarter up to 113.3% of the amount of newsprint lawfully used in the corresponding calendar quarter of 1944 or the second calendar quarter of 1945, or 10 tons, whichever is greatest. Publishers of shopping guides, free distribution papers, want advertisement publications, and free distribution publications in newspaper format, may use up to 105% under like conditions.

Kraft paper production is expected to increase as the result of the revocation of L and M orders. Such mills producing kraft board as can readily change, may find it more profitable to produce paper rather than board, as the ceiling price is higher on paper. July production of wrapping paper declined 13% from June, with kraft wrapping down 16%. Bag paper output in July increased 24% over June, with the largest increase in grocery and variety bag paper, up 25%. Converting papers conformed to normal seasonal declines and the production of these papers dropped 11% in July from June. Shipping sack paper production, up 4,000 tons in July above June, reflected the essential nature of the product in maintaining supplies for the armed forces as well as civilian needs.

Increased output in sanitary papers is expected soon. July output was 8% less than June, but the revocation of Order M-241-a should substantially increase the supply of toilet paper, facial tissue, towels and napkins. Tissue paper output showed a substantial decline of 6.5% in July below June, reflecting the tight wood pulp supply situation. Larger output will come, it is expected, with improvement in the supply of wood pulp.

Paperboard controls on production and consumption were entirely removed on September 30, 1945. The new preference rating MM for military and CC for civilian uses, are now effective under PR 28 and PR 29.

All of OPA's regulations continue in effect. With the reduced military need for V-board and removal of controls on production, a decline in the output of kraft board is expected. The improved civilian supply of folding boxboard was indicated with the revocation of Conservation Order M-378 on August 22, 1945.

Out of the total requirements of approximately 625,000 tons quarterly, 285,000 tons were for packaging foods, and more than 50,000 tons were for military uses. Miscellaneous board, used in the manufacture of shell containers and other military items, as well as for packaging foods, required more than 175,000 tons a quarter.

Steady demand for paperboard is expected during the current reconversion period and indicates a relatively high per cent of capacity. As July is seasonally a relatively slack month, wholesalers' sales and inventories continued to indicate little change from June. Paper sales declined 3% and inventories were unchanged.

Paper Reserve Needs Reduced

WASHINGTON, D. C., October 10, 1945—Reserve requirements covering the production of all paper and paperboard have been reduced to 20% of monthly production, and inventory ceilings, except for newsprint, have been increased materially, the War Production Board announced today.

By amending the paper and paperboard conservation order (M-241), which controls paper and paperboard production, excepting containerboard, and establishes reserves to insure the filling of governmental and bottleneck reconversion orders, WPB today effected a relaxation permitting paper dealers and consumers to rebuild their depleted inventories, WPB Paper Division officials explained.

The current amendment reduces reserve production of rag content papers, used for bonds, currency, letterheads and certain other commercial and industrial purposes, from 35 to 20% of the manufacturer's monthly production. Reserve of all other types of paper and paperboard remain at 20% of total production of a grade or class, it was pointed out.

At the same time, the list of Governmental procurement activities benefited under Order M-241 was modified slightly by removing inactive accounts and is now confined to the military and certain other agencies.

Present supplies of paper and paperboard and the recent revocation of all printing and publishing limitation orders, save the order covering newsprint, warrant the modification of previous war-time inventory restrictions in order to provide equitably for all persons affected by Order M-241, WPB officials said. Under the amendment, inventories of consumers and mills are increased from 30 to 50 tons or from 30 to 90 days' supply, based on average rate of consumption during the latest three preceding months, or on the projected consumption during the next three months. Paper merchants' inventories are now limited in dollar value to $25,000 or 50% of the cost price of his sales during the first half of 1944, whichever is greater.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1945		Corresponding Weeks—1944	
Aug. 25	95.4	Aug. 26	92.2
Sept. 1	**95.2**	Sept. 2	89.4
Sept. 8	**75.9**	Sept. 9	74.4
Sept. 15	94.0	Sept. 16	92.8
Sept. 22	94.3	Sept. 23	91.9
Sept. 29	*97.0*	Sept. 30	93.5

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Avg.
1944	88.7	88.5	88.1	87.6	88.7	89.8	80.3	90.6	88.2	92.5	90.6	92.4	88.1
1945	86.7	89.4	90.2	88.1	89.8	91.2	80.8	88.6	*90.2*				

COMPARATIVE YEARLY SUMMARIES

	1938	1939	1940	1941	1942	1943	1944	1945
Year to date	69.6	79.8	86.2	95.2	92.1	88.2	87.9	88.2
Year Average	71.5	83.4	85.6	97.4	90.4	87.8	88.1	

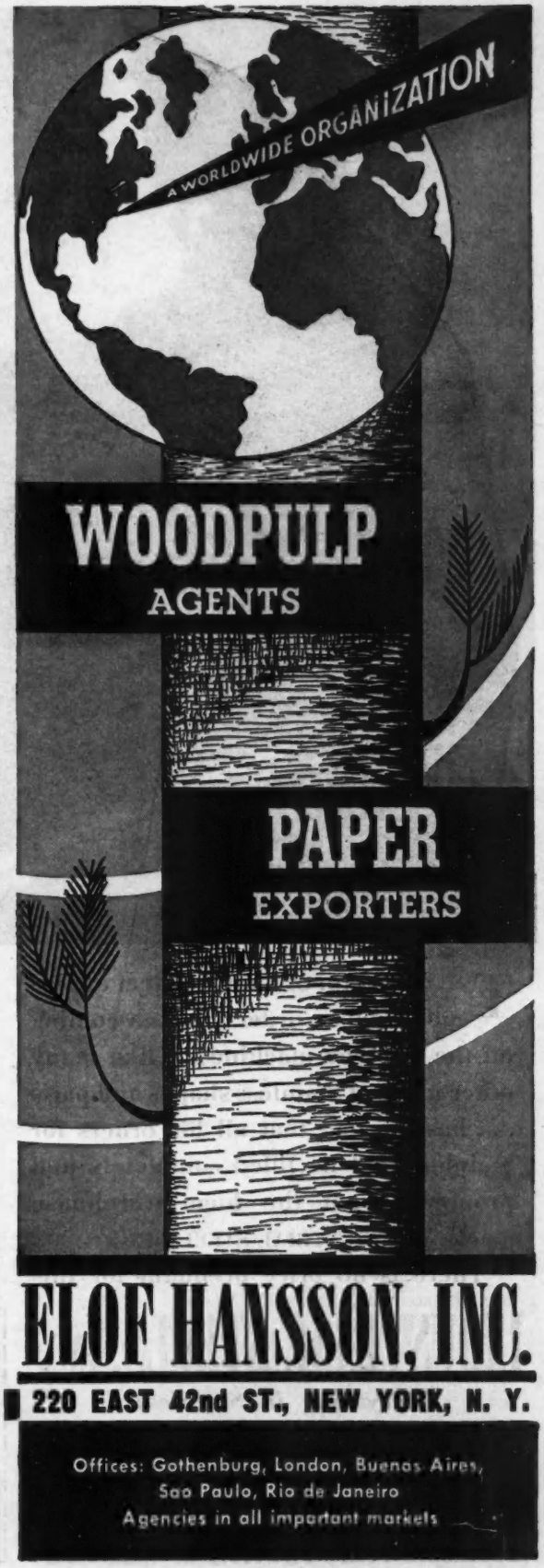
* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

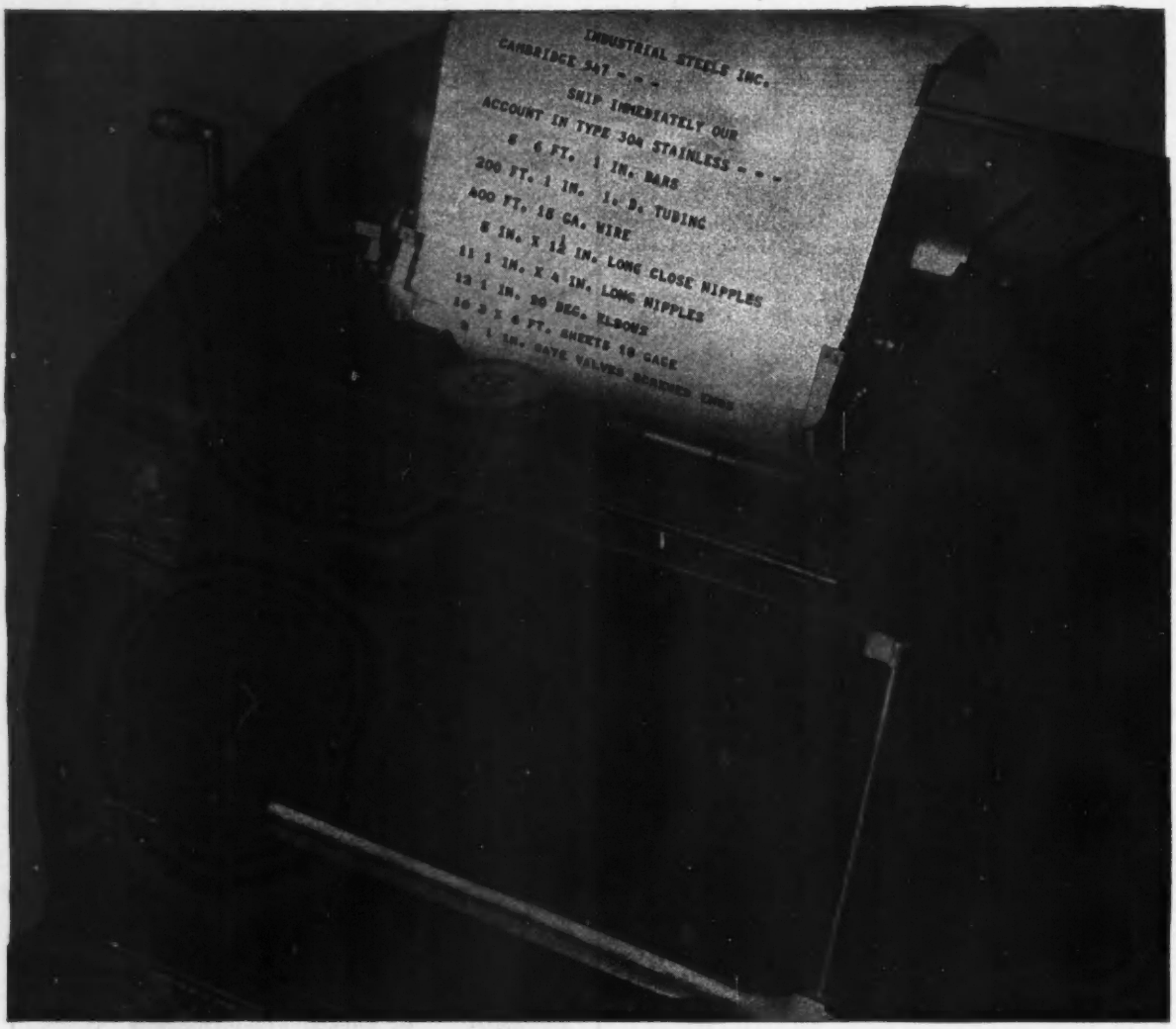
PAPERBOARD OPERATING RATIOS†

Current Weeks—1945		Corresponding Weeks—1944	
Aug. 25	99	Aug. 26	96
Sept. 1	97	Sept. 2	97
Sept. 8	80	Sept. 9	80
Sept. 15	96	Sept. 16	97
Sept. 22	93	Sept. 23	96
Sept. 29	96	Sept. 30	95

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Avg.
1944	90	96	95	96	96	96	85	96	92	95	95	85	93
1945	91	95	97	97	96	96	86	90	*91*				

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Assn.

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122 E. 42nd St., New York 17, N. Y.
Edited by R. G. Macdonald, Secretary

Waste Water and Fiber Recovery With Reclaimers of the "Precipitator" Type

By S. B. Applebaum[1] and J. R. Rhinehart[2]

Abstract

The reclaimer operates on principle of the Spaulding precipitator, VIZ., *upflow tank in which waste water contacts fibrous solids previously accumulated and kept suspended. Previous "savealls" disposed of solids as quickly as removed so that solids did not aid in treatment. The reclaimer's use of the suspended fibrous solids filter accomplishes striking clarification. Both the treated water and concentrated solids blown off may be reused in certain processes. Coagulant found unnecessary in many cases; operating cost therefore very low and investment rapidly returned.*

Waste water treatment in the pulp and paper industry is of growing interest for four reasons:

1. Many mills depend on wells for their water supplies and as the mill expands the available well water capacity frequently becomes inadequate because of a falling watertable in the ground. By treating waste water so that it may be reused, existing water supplies may be made adequate.

2. The streams into which waste water is discharged are becoming increasingly polluted as the catchment area feeding the stream becomes more and more industralized. These streams serve other purposes besides acting as a sewer for industrial plants, such as water supply, navigation, fish-life, recreation, etc. State Boards of Health and other authorities are receiving growing complaints as a result of this increasing load of pollution in the streams and therefore transmitting this pressure to clean up the water courses to the industrial communities by treating the waste water.

3. The waste waters from pulp and paper mills contain some of the "stock losses" incident to the wet processing. Treatment of the waste water therefore often presents opportunities of recovering valuable products that would otherwise escape with the waste water.

4. The waste waters are usually warm and therefore their recovery saves considerable amounts of fuel.

Waste waters in pulp and paper mills (particularly the white waters) have been treated for some time in "savealls." These are devices that separate fiber from the white water either by: (a) screening, (b) settling, or (c) flotation.

[1]Vice President, the Permutit Co., New York, N. Y.
[2]Field Test Engineer, the Permutit Co., New York, N. Y.

In all of these devices the separation of the fibrous solids from the water is accomplished mechanically either by catching the fiber on fine mesh wire screen or by using large tanks so that the velocity of flow is so small that the fibers settle by the force of gravity to the bottom, or by adding reagents which float the fibers to the top. Once the fiber is separated, it is withdrawn from the scene of action and no longer plays any part in the treatment of the waste water.

Spaulding Precipitator

The Spaulding precipitator was first introduced into industry to raise the efficiency and completeness of the chemical reactions usually involved in the water treatment art, as well as to improve the separation of the precipitates from the treated water. The principle involved was to maintain a so-called "sludge blanket" or suspended sludge filter—consisting of the previously accumulated precipitates — in a tank by gentle agitation and to arrange intimate contact of the water and chemicals with this suspended sludge filter. Then the tank was so designed that the upward velocity of the rising water was gradually decreased so that finally the velocity was so low that the sludge or precipitates were left behind and a clear treated water emerged. The contact of the water with the suspended sludge filter was usually made to last for 15 to 30 minutes or longer. This long contact between the solid and solution phases brought about the desired saturation equilibrium. Figure 1 shows a standard Spaulding precipitator.

During the last decade the precipitator has come into extensive use for the following water treatment processes:

1. Water Softening: By cold lime (or lime soda) process and upward filtration through suspended sludge blanket consisting of precipitates produced by softening reactions.

2. Turbidity and Color Removal: By coagulation and upward filtration through suspended sludge blanket containing floc produced by coagulant.

3. Taste and Odor Removal: By upward filtration through suspended sludge blanket containing activated carbon.

4. Silica Removal: By upward filtration through suspended sludge blanket containing magnesium hydroxide or oxide.

5. Fluoride Removal: By upward filtration through suspended sludge blanket containing magnesium hydroxide or oxide.

It was quite natural therefore to investigate the value of a suspended sludge filter in connection with waste water treatment. All the previous white water "savealls," as previously mentioned, disposed of the solids rapidly and did not accumulate them to aid in the treatment. It was suspected that intimate contact with previously accumulated fibrous solids might be helpful in waste water treatment also. But the very striking clarifying effect obtained thereby exceeded anticipation.

Several years ago a southern sulphite pulp mill using a well water supply found that the mill expansion called for additional water which it would be difficult and expensive to obtain from the ground water sources. Also the waste water discharged was causing undue pollution. About 6,000,000 gallons of waste water were available from unbleached stock processes, screens, rifflers, and deckers that might be treated and reused in certain processes if the treatment could be made efficient enough to remove over 85% of the original fiber content. In this case there were about 200 to 300 p.p.m. (1.66 to 2.5 pounds per thousand gallons) of fiber present in the waste water together with traces of starches, sugars, terpenes, resins, etc.

First a pilot plant was built on the old fashioned lines of adding a coagulant such as alum and then agitating and finally settling the floc in a horizontal flow settling chamber. This removed about 30 to 50% of the solids present and required large doses of coagulant.

Then a small laboratory unit was constructed to demonstrate the effect of a suspended sludge filter. A carboy was inverted and the waste water was introduced at the bottom so as to create sufficient turbulence to suspend the fibrous solids. No coagulant was added. The effluent was withdrawn at the top. As the solids accumulated, the clarity of the effluent improved. When the test was first started the solids removal was under 50%. When the solids suspended occupied about two-thirds of the carboy, the solids removal exceeded 85%. Apparently the contact with the suspended fibrous solids resulted in a self-coagulating effect, which, together with the actual mechanical straining by passage upwardly through the suspended solids, were responsible for the great improvement in the clarification accomplished.

Another similar test some time later at the Southland Paper Company at Lufkin, Texas, resulted in the installation of a Permutit "Reclaimer" for a capacity of 1180 g.p.m. or 1,700,000 gallons per day. The paper "Waste Water Utilization by Clarification" by C. C. Porter and C. Carpenter gives details of the results obtained from this installation.

Figure 2 shows a typical flow diagram. The waste water is collected in a suction well where it is roughly

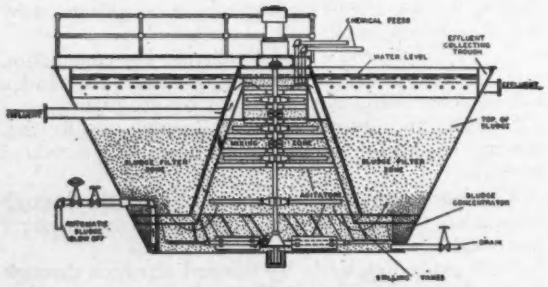

FIG. 1
Spaulding Precipitator

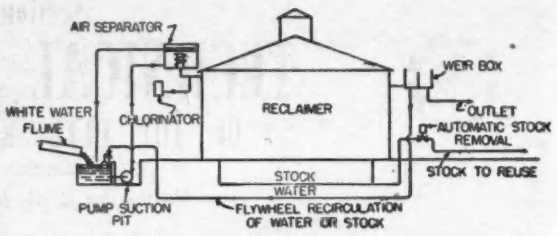

FIG. 2
Flow Diagram of Reclaimer for Stock and Water Losses

screened to remove cull screen rejects, chips, and slivers. It is then pumped into an air separator where foam and air bubbles are released. The separator also acts as a head box since it overflows back to the suction well. This does away with troublesome level regulating valves. The water flows by gravity from the air separator to the reclaimer. Chlorine or other sterilizing agent may be added to the influent of the reclaimer to prevent slime growths. It saves an equivalent dose of chlorine that would be added usually in the process where the treated water is reused.

The reclaimer is usually supplied with an internal concentrator where a portion of the suspended fibrous solids settle out and concentrate and this concentrate is blown off automatically to be reused in certain processes if desired. Thus the top of the suspended "blanket" is kept at the desired level.

Recirculation of a portion of the treated water and concentrated solids back to the influent may be found advantageous in certain cases to establish a flywheel effect. A fairly constant temperature range is desirable.

Usually no coagulant is required, therefore the operating cost is negligible. The operation is simple and the maintenance of the suspended solids is accomplished by gentle agitation requiring very little power. The savings accomplished by the reuse of the treated water and reuse of the concentrated solids usually returns the investment in a short period.

New TAPPI Members

The Executive Committee of the Technical Association of the Pulp and Paper Industry has elected the following to membership:

A. Crossley Smith, Jr., Senior Chemical Engineer, The Atlantic Refining Co., Philadelphia, Pennsylvania, a 1932 graduate of Lehigh University.

Roger H. Casler, Partner, R. S. Sanford Engineering Co., Oakville, Connecticut, a 1924 graduate of Syracuse University.

Edith Dermaner, Librarian, American Viscose Corp., Marcus Hook, Pennsylvania, a 1937 graduate of Temple University.

Paul Easton, Technical Service Engineer, Hercules Powder Co., Paper Makers Chemical Div., Kalamazoo, Michigan, a 1936 graduate of Michigan State College.

Ralph S. Millett, Forest Products Engineer, Forest Products Laboratories of Canada, Isabella & Metcalfe Sts., Ottawa, Ont., Canada, a 1923 graduate of Nova Scotia Technical College.

Geddes Thomson, Assistant Technical Director, Chas. Bruning Co., 4700 Montrose, Chicago, Illinois. Educated in private schools.

Howard M. Waddle, Chief Chemist, West Point Manufacturing Co., Shawmut, Alabama, a 1940 graduate of the University of Wisconsin.

Identification and Characteristics of Typical Slime-Forming Organisms*

By R. B. Martin[1] and John G. Dobson[1]

Abstract

A few of the more important types of organisms responsible for paper slimes and other industrial difficulties are described and the laboratory procedures required for their identification are given.

Proper control of slime-forming organisms depends on their recognition, tracing the source, and maintenance of sterile conditions throughout the system The methods of control are discussed and recommendations on procedure are presented.

Every mill operator recognizes what slime is, and most operators fully appreciate that microorganisms are responsible not only for slime accumulations in stock lines, in white water systems, and on wires and felts, but are also responsible for corrosion of pipe lines and wires, for hydrogen sulphide odors within the mill, and for various other destructive processes.

While recognizing the effects of these organisms, most operating personnel have left to the bacteriologist the methods of identifying the organisms and determining their life cycle. However, the information furnished by the bacteriologist will be greatly enhanced in value if the laboratory methods by which the results are obtained are thoroughly understood.

This paper attempts to outline a method of identifying a few of the more important types of organisms responsible for paper slimes and other industrial difficulties, and to provide a practical summary of the laboratory technique and plant control methods.

Specific Organisms

Most slime samples examined in the laboratories yield a wide variety of organisms. Naturally most contain several forms of air, water, and soil bacteria but when proper sampling has been done, one specie usually predominates.

Typical Organisms

The organisms which are outlined here are representative of the common forms most frequently found by the Wallace & Tiernan Research Laboratories in examination of slime samples forwarded from all parts of the United States.

Algae.—The simplest and most primitive members of the plant kingdom are the Thallophytes which are plants not differentiated into root, stem, etc. These are divided into two main series: the algae, and the fungi.

The algae most frequently encountered in fresh water belong to the blue-green, and diatom groups. Brown and red algae have also been found but their occurrence is confined almost entirely to sea water. Most algae activity occurs in the upper layers of open water bodies where they are exposed to both light and air. The blue-green algae are the lowest of green plants and consist of single cells. However, in many species these cells adhere together to form colonies or filaments. An example of the filamentous form is the *Oscillatoria* (Fig. 1) which has the distinction of being the only blue-green algae which exhibits motility. Figures 2 and 3 show the size and shape of other blue-green algae.

However, these photomicrographs fail to reveal the distinguishing characteristics of these organisms. In the blue-green algae the pigment is distributed more or less uniformly throughout the cell material and is not limited to definite colored bodies (chloroplasts) as is true in most other green plants.

The green algae are the largest and most diverse group and are identified by the bright green pigment which is confined to a definite structure in the body of the organism. This chloroplast may be in the form of a twisted ribbon as is seen in the filamentous algae, *Spirogyra* (Fig. 4), or it may be girdle-shaped as in the *Ulothrix* (Fig. 5). Many of the one-celled green algae are motile by means of cilia and have a red pigment spot near one end.

Diatoms are minute one-celled plants having hard, flinty cell walls impregnated with silica and consisting of two halves which fit together like a box and cover. The cell walls have intricate markings consisting usually of delicate parallel lines which can be resolved with a good microscope and proper lighting. Distinctive forms are shown in Figs. 6 and 7.

Most algae are sun-loving organisms and will not grow in dark or closed pipe lines. They are readily controlled by additions of copper sulphate, chlorine, or phenolic compounds, and their activity should never be used as an index of the efficiency of a slime control process in industrial water supplies. Quite often they may be readily eliminated from the surface of a cooling tower or from spray nozzles of a cooling pond without in any way reducing the population of the true slime-forming organisms which are causing heat exchanger difficulties. Most algae contain chlorophyll and have ability to split oxygen from carbon dioxide using sunlight as a source of energy and to release free oxygen to the water supply. Occasionally this ability results in a sharp increase in the oxygen content of cooling waters with attendant serious oxygen corrosion of equipment.

Fungi.—The fungi are Thallophytes which do not contain chlorophyll. Consequently, they must live on organic food or energy available from inorganic chemical compounds. These forms vary widely in shape and appearance, the smallest and most common being the microscopic bacteria which will be discussed in a subsequent section. The larger forms include the well known mushroom. Most fungi are terrestrial plants although some are semiaquatic in their growth habits. Most are also spore-forming. By this is meant that they develop a secondary life form, dormant in nature, during which the organism is capable of resisting adverse conditions of moisture, heat, or chemical poisons. These spores, after having lived through such an unfavorable condition, develop into a fully active or vegetative stage of life upon the return

* Presented by title at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 19-22, 1945.

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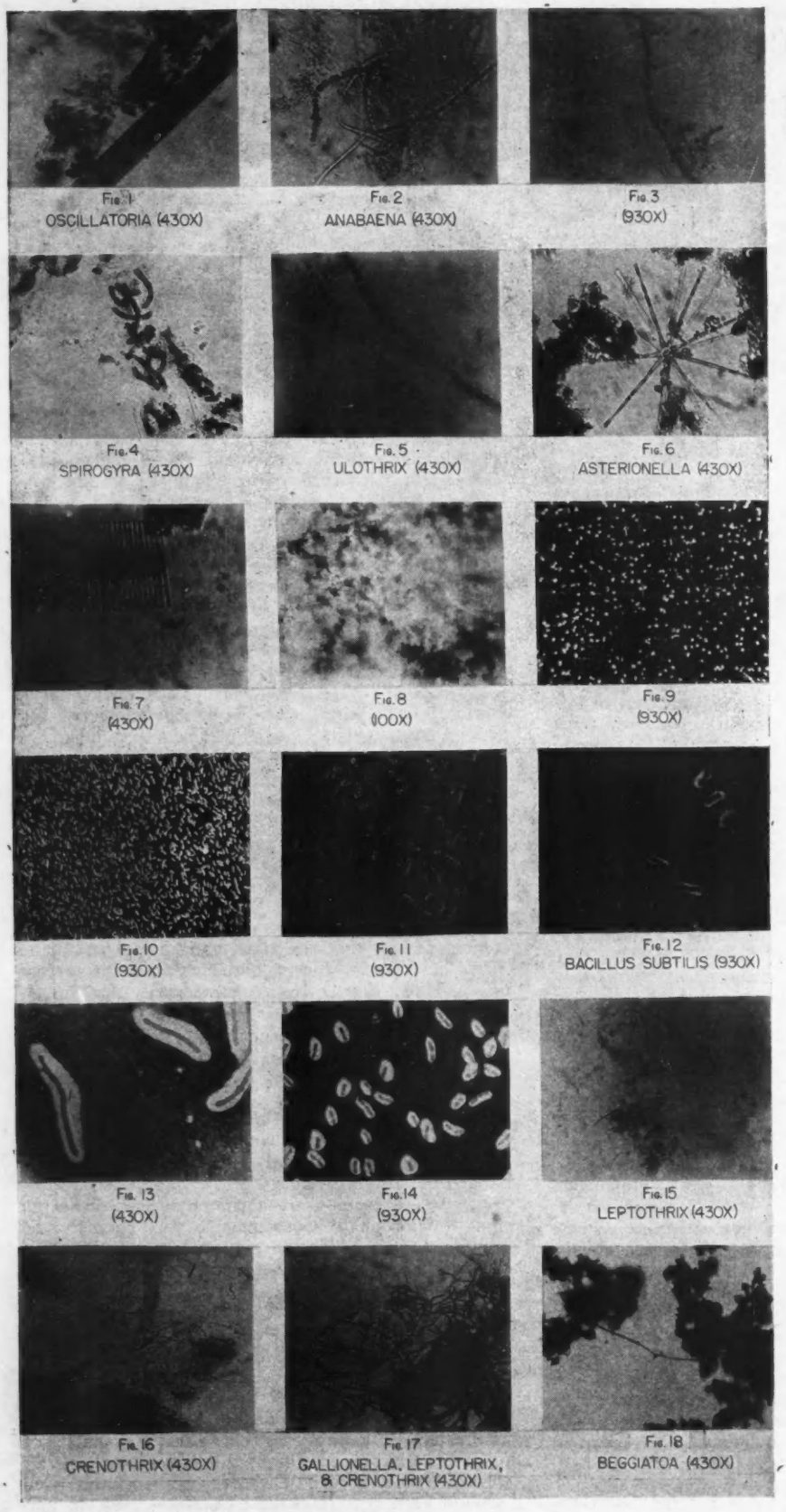

Fig. 1 OSCILLATORIA (430X)
Fig. 2 ANABAENA (430X)
Fig. 3 (930X)
Fig. 4 SPIROGYRA (430X)
Fig. 5 ULOTHRIX (430X)
Fig. 6 ASTERIONELLA (430X)
Fig. 7 (430X)
Fig. 8 (100X)
Fig. 9 (930X)
Fig. 10 (930X)
Fig. 11 (930X)
Fig. 12 BACILLUS SUBTILIS (930X)
Fig. 13 (430X)
Fig. 14 (930X)
Fig. 15 LEPTOTHRIX (430X)
Fig. 16 CRENOTHRIX (430X)
Fig. 17 GALLIONELLA, LEPTOTHRIX, & CRENOTHRIX (430X)
Fig. 18 BEGGIATOA (430X)

FIGS. 1 TO 18

of a more favorable environment.

The filamentous fungi consist of masses of cobweblike strands called mycelia which bear a fruiting body containing the spores. Nearly all of these organisms are highly aerobic and do not develop in the absence of oxygen. Pipe lines carrying fairly warm waters, which are infected with filamentous fungi, may become clogged with masses of mycelia.

Fungous filaments are best studied under magnification of 430 diameters, and the individual species may be determined from the appearance and position of the spores. For more critical identifications they are cultured on Sabouraud's agar for further microscopic study of their life cycle. Figure 8 shows the structural make-up and spore bodies of a fungous encountered in typical industrial slime problem.

Bacteria.—Bacteria are essentially unicellular plants which sometimes grow in chains or clusters. They are microscopic in size with a very rapid rate of growth. One organism can produce in a few hours millions of organisms in a colony which can be seen spreading over the surface of the agar or of natural food material. Bacteria are classified into three structural types, the *Coccus* which is spherical, the *Bacterium* or *Bacillus* which is rod shaped, and the *Spirillum* which is curved.

Bacteriologists cannot identify bacteria by structural appearance alone, but must rely on reactions to stains, on growth on nutrient materials, on waste products produced, and on color and form of colonies on nutrient media for positive identification.

Some types are aerobic growing only in the presence of free oxygen; while others are anaerobic growing only where no free oxygen is available.

Some bacteria are capable of producing spores,

while others surround themselves with a gelatinous sheath or capsule which protects them against heat, dryness, or chemical treatment for long periods. Special groups of bacteria, which from their appearance would suggest a close relationship to algae or filamentous fungi, are of particular importance in treatment of industrial waters. The iron bacteria and some of the sulphur bacteria come within this category.

The predominant organisms found in about 50% of the slimes which have been examined at the laboratory are short Gram negative rods which produce raised mucoid colonies when cultivated on sugar-enriched nutrient agar. The color of the colonies varies from clear, translucent, to dark-gray, opaque, with many showing white, yellow, or brown tinges. Deeply colored colonies are seldom encountered. Isolated colonies are round with smooth margins and are usually dome-shaped although many show a depressed center on aging. The organisms themselves are small rods 0.5 to 0.8 microns in diameter and usually about 1 to 2 microns long, although often very short rods are encountered which appear almost as cocci. When stained by the proper method the capsules appear as halos around the organisms varying from 0.5 to 2 microns in thickness. Examples of these organisms are shown in Figs. 9, 10, and 11. Of the short Gram negative rods which have been examined a majority have been found to be in the genus *Aerobacter*. *Aerobacter aerogenes* is the most common specie. Less frequently encountered are species of genera *Escherichia, Alcaligenes, Achromobacter,* and *Pseudomonas*.

Most of the remaining 50% of bacteria predominating in the slimes which have been studied are aerobic Gram positive spore-bearing rods. These are usually large organisms about 1 to 1.5 microns in diameter and 3 to 6 microns long and usually occur in pairs or in long chains. The colonies are most often spreading in nature and many have a frosty appearance although some are smooth and viscid during certain stages of growth. The edges of the colonies are usually ragged in appearance and the color varies from white to light brown. On staining with the India ink method, capsules are visible which vary from a barely discernible halo to wide zones many times the width of the organism. Examples are shown in Figs. 12, 13, and 14. One may observe evidences of spore formation in some of the cells which becomes more pronounced as the culture ages.

These aerobic Gram positive spore-forming rods are members of the genus *Bacillus*. Although bacteriologists are not in complete accord on the classification of species within this genus, a number of mucoid variants of *Bacillus subtlis* and *Bacillus megatherium* have been found in many of the samples studied.

Iron Bacteria.—The "iron bacteria" are those that may derive their energy from the oxidation of iron compounds according to the reaction:—

$$4\ FeCO_3 + O_2 + 6\ H_2O - 4\ Fe(OH)_3 + 4\ CO_2 + 81{,}000\ cal.$$

With the energy obtained from this reaction, the organisms synthesize the carbon from CO_2 into cellular material and carry on the processes essential to their life. If the efficiency of the process is assumed to be 5% which is of the proper order for a biological reaction, about 500 grams of ferrous iron are oxidized to obtain sufficient energy to synthesize 1 gram of carbon into cellular material. The vast amount of iron turned over by the organisms is of no further value to them but since these cells are generally covered with an extensive sheath of capsular material, the particles of precipitated iron hydroxide are caught and held close to the cell mass giving rise to the slimy deposits.

Bacteriologists recognize two groups of iron bacteria: the *Chlamydobacteriales*, or filamentous bacteria, and one genus of the *Caulobacteriales*, the bacteria attached to stalks. Of the former there are three genera involved, the *Clonothrix*, the *Leptothrix* (Fig. 15), and the *Crenothrix* (Fig. 16) which are differentiated by the way branching occurs in the filaments. All of these organisms use manganous salts as well or even better than ferrous salts and therefore may have manganese oxide deposits in the sheath. They can also oxidize organic matter for energy and thus do without the metallic salts, but they generally cannot stand the competition with other bacteria in the presence of organic matter. Therefore, under natural conditions, these organisms flourish only in waters low in organic material.

The stalked bacteria, the *Gallionella,* (Fig 17 shows *Leptothrix, Crenothrix* and *Gallionella*), were formerly named *Spirophyllum* because of the twisted ribbon appearance. It was found that the twisted ribbon is really a stalk of almost pure colloidal iron hydroxide excreted by the small oval bacterial cell at one end. This organism cannot use manganese and its growth is depressed by the presence of soluble organic matter. It is therefore a true "iron bacteria" in the strictest sense of the term. Another peculiarity of this organism is that its optimum growth occurs at about 6 to 10° C., so it is often found in well waters or in the winter-time, while in the summer it is replaced by *Leptothrix* or *Crenothrix*.

A few other species have been termed "iron bacteria" but confirmation of this work has not appeared. In general, the "iron bacteria" carry out only one important activity, namely, the oxidation of iron and manganese. However, since they undoubtedly synthesize cellular material by means of enzymes and since enzymatic reactions are reversible, it is conceivable that they might also break down organic matter. But as has been stated previously, any accumulation of organic material will attract other organisms to the disadvantage of the iron bacteria and since soluble organic material inhibits some of the iron oxidizing organisms, these possible activities probably seldom occur.

The "iron bacteria" are identified microscopically by observation of the suspected material under magnification of about 400 diameters. *Gallionella* must be observed without the addition of acid since that will dissolve the typical twisted form which is made up of iron hydroxide. The other types are often difficult to see unless the acid is added since the iron hydroxide covers them completely. It is advisable to grow some in the laboratory in solutions containing the constituents of iron-bearing soil and waters to enable the technician to compare those found in the industrial sample with pure cultures.

Sulphur Bacteria.—The bacteria involved in the sulphur cycle in nature are often encountered in industrial waters. These organisms do not form any uniform group, either morphologically or physiologically. Most common are those which split hydrogen sulphide out of sulphur-containing organic matter. Since most proteins contain sulphur, any proteinaceous material which is broken down by bacteria in the absence of oxygen will yield hydrogen sulphide, and the organisms responsible may vary from spore-forming anaerobes to the common colon bacilli.

The process of producing hydrogen sulphide from inorganic sulphur compounds is carried out by one

recognized species, *Sporovibrio desulfuricans*. This spore-forming anaerobic curved rod-shaped organism will reduce sulphates, sulphites, and sulphur itself to hydrogen sulphide using the oxygen liberated in the process to oxidize organic carbon compounds such as sugar and thus obtain for itself a net energy balance. The organism grows best at elevated temperatures, and its presence should be suspected wherever hydrogen sulphide is being evolved from waters containing sulphates but low in organic matter of a proteinaceous nature. It is readily cultivated on the special anaerobic sulphite medium designed for this purpose.

Another group of organisms, the *Thiobacilli*, common inhabitants of the soil and of sulphur-bearing waters, derive their energy from the oxidation of sulphur to sulphates. The sulphuric acid thus produced has been blamed for corrosion of metals. These are short Gram negative rods which grow only in the presence of abundant oxygen. Most of them obtain their carbon from CO_2 and thus require no organic matter for growth.

A similar function is carried out by a group of so-called "higher bacteria," the *Thiobacteriales* which oxidize hydrogen sulphide to free sulphur. These organisms grow in long filaments in which can be seen granules of free sulphur and often a purple pigment. They grow in a scum on the surface of sulphide-bearing waters and can be easily detected by microscopic examination of such scums. Figure 18 shows *Beggiatoa*, one of the more common organisms of this group. It is evident that in processes involving waters containing sulphur in any of its forms one or more of the above types are likely to be encountered; however, many industrial processes yield hydrogen sulphide by purely chemical means and this should be determined before intensive bacteriological studies are undertaken.

The True Slime-Forming Bacteria

As has already been noted, a large group of organisms may be responsible for the production of slimes and microbiological accumulations on heat exchanger surfaces and on pipe lines in contact with water. The foremost of the true slime-forming bacteria are those which in the presence of excess food material will store such food material in the form of complex carbohydrate gels so that it may be used at times of adverse conditions.

When this substance is highly liquid in nature, it diffuses away from the bacterial cell and is known as a slime. Some of this slime will adhere to the cell in the form of capsules and cause the organisms to stick together in large masses. Organisms producing large amounts of slimy material can be detected by the viscid nature of the colonies grown on agar plates. More dramatic demonstrations of the presence of a slime layer or capsule are evident from microscopic study of specimens stained by the staining procedure described in the following section.

Not only do capsules on organisms cause sliming difficulties so often encountered in processes where water is employed, but they give the organisms considerable protection against antibacterial agents such as heat, dryness, and chemicals. Therefore, not only do slime-forming organisms create disturbances that would go unnoticed if a similar number of non-capsulated organisms were growing in the same place, but they are somewhat more difficult to eradicate because of their protective coating.

Laboratory Technique

It should be remembered that the following description of the actual laboratory method is limited to specific techniques and that reference must be made to standard texts and current literature for detailed and special methods.

Collection of Samples

The samples are usually most easily obtained from the inside surfaces of heat exchangers, pipe lines, or strainers. Care should be taken that they are removed with a sterile instrument and immediately placed in a bottle which has been previously sterilized in a dry-air oven at a temperature of 150 to 175° C. for 2 hours. Sufficient water in which the organisms have grown should be added to the sample to assure a continuous supply of food and to assure a continuation of aerobic or anaerobic conditions during the period of storage. If the sample is to be stored for more than a few hours between collection and examination, the sample should be held as closely as possible to 10° C. An additional precaution which may be taken is to determine the pH of the water at the time of the sampling and determine the pH of the sample at the time of examination. If a shift of more than 0.1 or 0.2 of a unit of pH has occurred, the results of the examination should be interpreted accordingly. Under no circumstances should any sterilizing agent or preservatives be added to the sample.

Macroscopic Examination

Immediately upon receipt in the laboratory, the sample is examined for color, odor, pH, and amount of sediment. If reds or red-browns are predominant in the sample, *Crenothrix* or other iron bacteria would be suspected and proper identification means should be carried out. If hydrogen sulphide is noted in the sample, sulphur-reducing bacteria would be suspected, and culture on the appropriate medium should be carried out to verify suspicion. If blue or blue-green colors are predominant, the most probable cause is one of the various algaes which can be identified directly by microscopic examination of the sample. If the pH has been depressed between the time of sampling and the time of examination, extensive growths probably have occurred, and organisms originally present in small numbers may have become predominant.

Microscopic Examination

As soon as possible after receipt in the laboratory, a "wet mount" is prepared by placing a small amount of the sample on a glass slide for microscopic examination. The larger microscopic forms are noted under magnification of 100 diameters and an estimate of their density is recorded. The mount is then examined under higher magnification for identification of these organisms. The presence of smaller organisms should then be noted.

Further wet mounts may then be made of the sample treated with acid or stained with iodine. Formula for Lugol's iodine solution is given below.

The identification procedure, if *Crenothrix* or other iron bacteria is suspected, is as follows:

1. To about 2.0 ml. of slime add 3 ml. of 5% hydrochloric acid and allow 1 minute reaction time. This dissolves the iron deposit on the body-sheath of *Crenothrix*, etc.
2. Add 0.5 ml. of Lugol's solution to stain the specimen.
3. Examine under low power and high power under microscope—100× and 430× magnification.

An inexperienced operator may not notice any living organisms, and will sometimes pass over the smaller forms as being amorphous material. Because of this, a plating procedure is recommended.

Culture Methods

The microscopic examination usually gives the necessary information concerning the algae, multicellular fungi, and the higher bacteria such as the iron bacteria, but reveals little or nothing concerning the true bacteria except that their presence may be noted if they occur in large numbers. To identify these organisms, it is advisable to grow them on nutrient media. Bacteriological identification procedures have been worked out for the study of organisms most often encountered in biological accumulations causing industrial nuisance.

The complete details of the preparation of various culture media are beyond the scope of this paper, but formulas for the more common culture media are given below.

The most common method for identification of organisms is as follows: A nutrient or modified agar is selected which will be appropriate for the type of organism which is suspected. After the medium has been allowed to solidify in the Petri dish, a 0.5 ml. hook is dipped into the slime sample and streaked across the plate. Incubation is for 24 to 48 hours at 37° C. and 48 to 72 hours at room temperature. Incubation at room temperature will culture many organisms not active at 37° C., including secondary fungous forms.

Gram Stain

For classification and identification of a particular organism it is often convenient to perform a Gram stain. This method divides all organisms into Gram negative and Gram positive classification. The method is as follows:

1. Smear a bit of material from an isolated cultured colony on a slide with a loopful of sterile distilled water and fix with slight heating.
2. Immerse in a gentian violet solution for 1 minute.
3. Rinse in sterile distilled water.
4. Immerse in Lugol's iodine solution for 1 minute.
5. Decolorize in a solution of 1 part of acetone and 1 part of ethyl alcohol for 0.5 minute.
6. Immerse in a safranin solution for 2 minutes.
7. Dry the slide.
8. Observe with an oil immersion lens at 930 diameters. Gram positive bacteria will be stained purple, i.e., retain the violet stain; while Gram negative organisms will be stained red.

The Gram stain has no significance in distinguishing one genus from another, nor one family from another. It is not directly associated with any particular characteristic. It provides, however, a means of distinguishing between two varieties which are otherwise indistinguishable and thus permits recognition of the organisms responsible for biofouling.

Capsule Stain

In order to readily study capsulated organisms, it is advisable to prepare a capsule stain before microscopic examination. The following method is recommended.

1. Flame the glass slide.
2. Place a few drops of sterile distilled water on one end of the slide.
3. Add about half this amount of India ink(*) and mix with the distilled water.
4. Remove a small quantity of growth from the Sabouraud's agar and mix with the ink and water.
5. Spread the mixture over the entire slide with a second slide held at a 45° angle. Allow the ink to flow along the space between the slides before spreading. The mixture should be pulled along by the slide rather than pushed.
6. Allow to dry (may be heated slightly).
7. Fix the preparation by passing through a Bunsen flame.
8. Stain with basic fuchsin (0.1 gram in 100 ml. of distilled water). The capsule appears colorless between the stained bacterial cell and the background of ink.

(*) Use a good grade of India ink as some inks contain many organisms and may lead to confusion. Stain a film of the ink and water before using it with the slime organisms to determine if extraneous organisms are present.

Another capsule stain which can be used is a Congo red with a counter stain of alcoholic solution of acid fuchsin. The cell absorbs the fuchsin, the capsule is colorless, and the background is blue or light purple.

Total Bacteria Count

Where slimes are of consistency which permits them to be diluted with sterile distilled water, it is convenient to determine the total quantity of organisms present in any sample in order to estimate the degree of infection. The following procedure is recommended. Samples will vary widely in count, but most slimes will fall within the range of 100,000 to 1,000,000 organisms per ml.

One ml. sample of the stock to be tested is diluted in physiological salt solution to an amount depending on the degree of contamination. Final dilution should be such that the final bacteria count in the ml. of diluted stock should be between 30 and 300. One ml. of the diluted stock is placed in a sterile Petri dish. Ten ml. of the prepared agar are melted, cooled to 45° C., poured into the dish and thoroughly mixed. Incubation time is 48 hours at 37° C., or 48 to 72 hours at room temperature. Counting of the colonies is done on the standard counting plate. From the colony count and the dilution, the number of bacteria in the original stock can be computed.

It should be remembered that the organisms which are cultured by these methods are only those which thrive under the temperature and nutrient conditions supplied. Selection of broths, media, and environmental conditions should be as near the conditions existing in the water circuit as possible. Even then, conclusions should be drawn with care and reservation.

Laboratory Formulas

MODIFIED SABOURAUD'S AGAR

Agar 22.0 grams Distilled water 1000 ml.	Dissolved by autoclaving
Peptone (Bacto) 15 grams Dextrose 60 grams Nutrient broth (Bacto dehydrated) 12.0 grams Distilled water 500 ml.	Dissolve and add to autoclaved agar

NUTRIENT AGAR

The plate counts for determination of number of organisms are done on nutrient agar.

Agar	22.5 grams
Difco nutrient broth	12 grams
Distilled water	1500 ml.

SALINE AGAR

If the water in which the original organisms have developed is strongly saline, the actual or a synthetic sea water may be substituted for the distilled water.

SULPHUR REDUCING MEDIA

In the identification of sulphur reducing media the following nutrient media is useful:

K_2HPO_4	0.5 gram	$MgSO_4$	1 gram
Sodium lactate	5.0 grams	$FESO_4$	Trace
Asperagin	1.0 gram	Tap water	1000 ml.
		Agar	20 grams

LUGOL'S IODINE SOLUTION

Potassium iodide	2 grams
Iodine	1 gram
Water	100 ml.

Dissolve the potassium iodide in a few milliliters of water. Add the iodine, grinding in a mortar; when it has dissolved add the rest of the water.

GENTIAN VIOLET

Ten ml. of a saturated alcoholic solution of gentian violet in 90 ml. of a 1% carbolic acid solution.

SAFRANIN SOLUTION

Make up a saturated solution of safranin in 95% absolute alcohol. Dilute the saturated solution to 10% with distilled water.

Control Methods

The problem of the control of slime forming organisms in the water and stock circuits in a paper mill cannot be solved by any ready-made solution but must be developed for each individual mill, depending upon the particular water and pulp sources. Recent investigation (See "Slime Producing Coliform and the Coli-form-like Bacteria," 1944, J. R. Sanborn,

Journal of Bacteriology, Volume 48, Pages 211-217) has disclosed that the predominant organisms present in paper mill slimes are *Aerobacter cloacal, Aerobacter aerogenes,* and *Escherichia coli.* This conclusion was arrived at by analysis of slimes from 340 separate mills and 52% of the analyzed samples were found to contain coliform bacteria. It is fully recognized that a large number of other varieties are present in almost all paper mill slimes. (See "Bacteriology of Pulp Slime," 1931 by T. D. Beckwith, *Journal of Bacteriology,* Volume 22, Pages 15-22, and "Micro-Organisms in Pulp and Paper Mill Systems," 1933, J. R. Sanborn, Volume 26, Pages 373-378). However, most of the other organisms found, outside of the coliform group, are not capable of transforming carbohydrates into slimelike materials and therefore are not of great importance in the production of slimes within the mill.

Three separate sources of infection within a paper mill must immediately be recognized; first, the original fresh water source in which the predominant organisms are of the coliform group; second, the stock which may or may not be sterile depending upon the degree of preparation and bleaching to which it has been subjected, and upon the infection which has occurred since its original treatment; and third, the ever present infection from the air throughout the paper mill circuits.

Fresh Water Treatment

The fresh water supply to the mill, which is fairly free of organic matter, can usually best be treated by chlorination to residual levels of 0.5 to 2 p.p.m. of *free chlorine residual.* Many of the reports which have previously shown conflicting results have failed to differentiate true free chlorine residuals from chloramine residuals. Where natural ammonia or amino compounds are present in the fresh water, chloramine residuals will be first produced and only after sufficient chlorine has been added to completely oxidize these compounds will the true chlorine residual be obtained. Work carried on by A. E. Griffin and N. S. Chamberlin of the Wallace & Tiernan Technical Service Division, and not previously published, has clearly demonstrated the startling differences between the sterilizing effect of a chloramine and a chlorine residual. Water was taken from the Holston River and selectively seeded with capsulated bacteria native to that stream. The sample was treated with varying quantities of chlorine. Figure 19 is a graph of the quantity of chlorine added to the water against residual obtained as measured by the Ortho-Tolidine test. In area A, chloramines are present while in area B only true chlorine residuals exist. At or beyond the transition point known as the flash point, all chlorine residuals in the water exist as HOCL. The following table was prepared on the basis of this experiment. At stated intervals noted as "pc" on the curve a portion of the chlorinated inoculum was dechlorinated and plating was performed.

TABLE 1.

	Samples			
	1	2	3	4
Chlorine dose, p.p.m.	1.0	6.0	19.5	22.0
Chlorine residual, p.p.m. (1 min.)	0 8	4.1	15.2	17.0
Chlorine residual, p.p.m. (30 min.)	0.45	4.1	1.8	3.3
Plate count (1 min.)	9600	3500	13	100
Plate count (2.5 min.)	8200	3300	38	0
Plate count (5 min.)	7500	3000	1	0
Plate count (10 min.)	7300	2700	1	0
Plate count (15 min.)	6400	2700	0	0
Plate count (30 min.)	5400	2000	0	0
Plate count (60 min.)	5200	850	....	....
Plate count (120 min.)	4600	....	....	....
Control	Start 21,000		End 5,500	

It will be noted that sample No. 4 having a lower true chlorine residual than the chloramine residual occurring in sample No. 2, showed sterile conditions as compared to 3300 organisms per ml. in the sample carrying the chloramine residual. These resulting improvements in plate count due to use of free chlorine residuals are more clearly demonstrated by Fig. 20 which are actual photographs of the plates involved. It should be stressed that this work was done on natural river water with normal capsulated bacteria which were thriving in the river at the time and not in distilled water with laboratory cultured organisms.

Stock and White Water Treatment

However, after such treatment has rendered fresh water supply practically sterile, it is necessary to

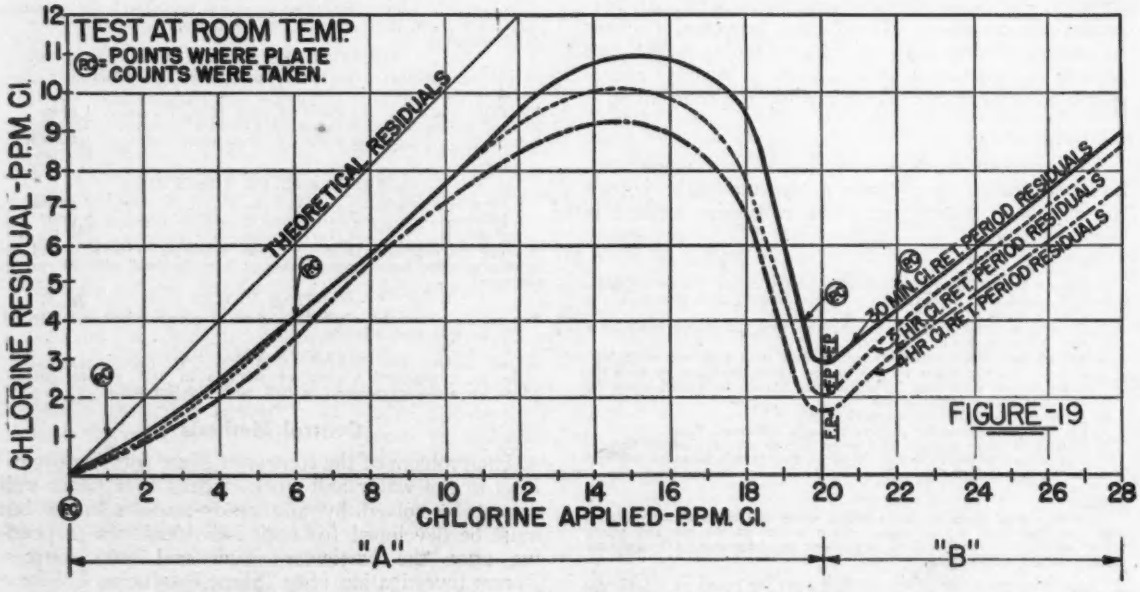

Fig. 19

maintain sterile conditions through the stock chests, beaters, and white water systems. In these systems, large quantities of organic matter make it impractical to use sufficient chlorine to obtain free chlorine residuals. If attempts were made to obtain such free chlorine residuals, large quantities of chlorine would be immediately taken up by organic matter and the sterilizing effect would be lost. In such systems, particularly in recirculated white water, materials which do not have the efficient sterilizing effect of free chlorine residuals but which are more stable in the presence of organic matter are indicated. It has been standard in this industry for some time to use for this purpose chloramine residuals.

In the formation of chloramines for such sterilization of organically loaded waters, considerable caution must be used. When the water in which they are to be formed has a pH of 7 or slightly above, monochloramines is the major compound formed. This compound will form in 2 to 3 minutes after addition of chlorine and ammonia to water at 70° F. However, at pH 5 dichloramines are primarily formed and nearly 20 minutes is required before this reaction is complete. The long reaction time has practical importance since if the chloramines are being formed in stock or white water lines having high chlorine demands, free chlorine may react with the organic matter before reacting with the ammonia and thus be dissipated. This fact has only recently been appreciated and it may be that some chloramine installations that seem to have had unusually high chlorine consumptions or unusually high chlorine ammonia ratios have dissipated chlorine in this manner.

Other organic compounds are suitable in special applications, J. R. Sanborn, in his article on slime producing coli-form bacteria (loc. cit.) has indicated the concentrations of various organic materials required to obtain sterilization of the more common slime-forming organisms. Choice of which of the varying sterilizing agents should be used would be dependent upon the chemical and physical arrangement of the white water system. In any case, it is a compromise of using compounds having slower sterilizing effect and higher cost than chlorine to obtain greater chemical stability. No fixed rules can be made, but recent experience has indicated that the various compounds can well be used as supplements, one to the other, in such a way as to develop substantially slime-free conditions throughout the mill. Where the mill is producing food papers or milk bottle stock, the maintenance of mere slime-free conditions is not sufficient. Actually sterile conditions must be maintained. Where such is required, sterile fresh water must be used and commendable results can often be obtained by using one of the pentachlorphenates or one of the mercurial compounds to carry the sterilizing effect not only through the white water system but also into the paper itself. However,

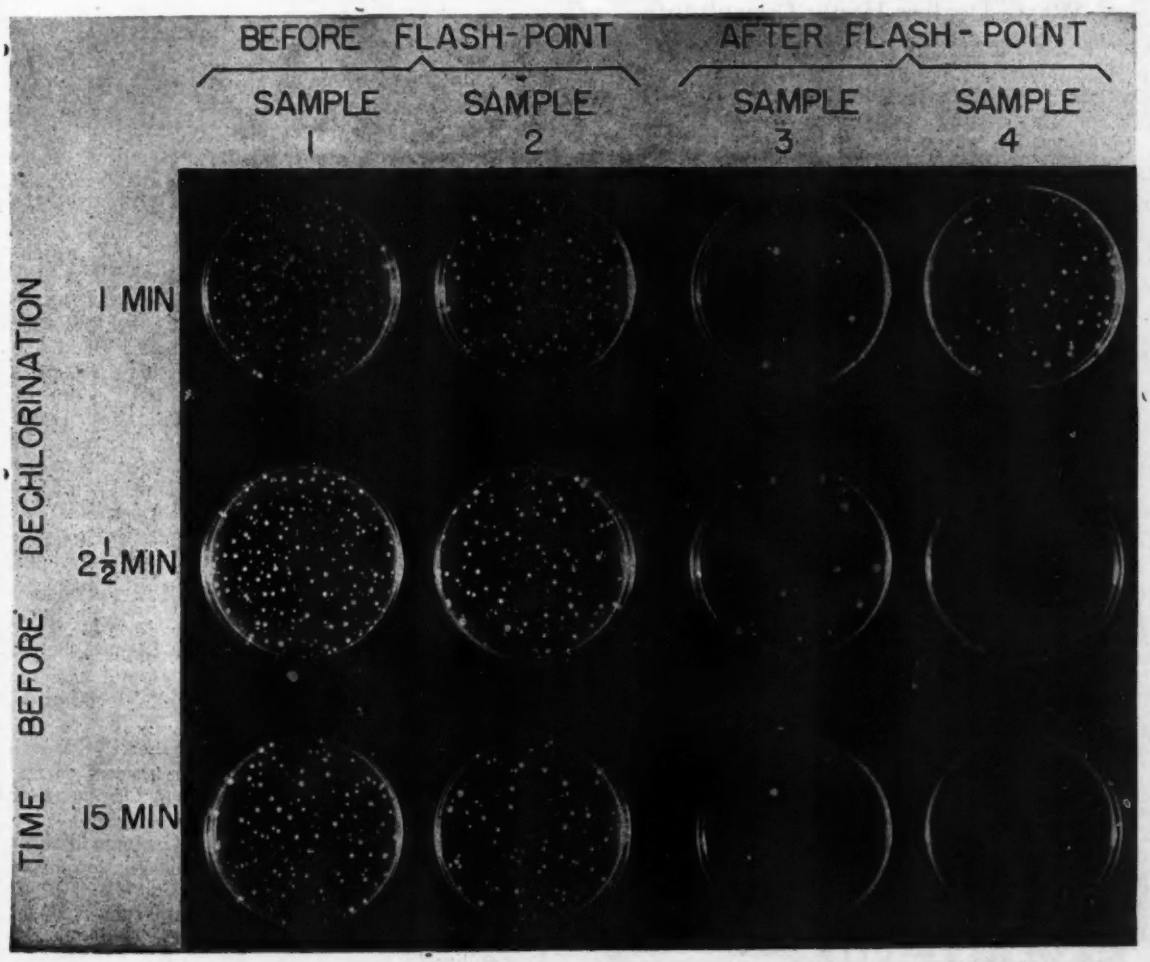

FIG. 20

this can only be done where the final use of the paper permits presence of these toxic compounds.

Summary

To summarize, the proper control of slime-forming organisms in the paper mill system must be dependent; first, upon the recognition of the major organism responsible for the difficulty, and if possible, tracing it accurately to its source; second, the sterilization of the fresh water and stock coming into the system; and third the maintenance of sterile conditions throughout the stock and white water systems of the mill. Each mill must be treated as a new problem, and results can only be obtained by adopting previously tried and proved methods on the basis of wide experience.

Particular caution must be exercised to determine the most economical and satisfactory points of application of the sterilizing chemical.

Acknowledgement

The writers wish to express their appreciation to A. E. Griffin and N. S. Chamberlin of the Wallace & Tiernan Technical Service Division for permission to publish their laboratory results covering the sterilization with chlorine and chloramines, and to Dr. Orville Wyss and Allan Bell of the Wallace & Tiernan Research Laboratories for their assistance in the preparation of portions of this manuscript.

Waste Dealers Honor Consultants

The Executive Staff of the National Association of Waste Material Dealers, Incorporated, were hosts at a dinner held at the Waldorf-Astoria, New York on Wednesday evening, October 3, in honor of a group of association members who had served in various capacities in Washington.

The group constituting the Board of Consultants to the Association's Staff is as follows: Paul Jos. White, President of N.A.W.M.D. and consultant to the Salvage Division of WPB; James T. Flannery, formerly chief, Rag and Waste Paper Unit, Paper and Paper Products Branch of OPA; Herman Moskowitz, consultant to Salvage Division of WPB; Lowell S. Thomas, deputy chief, Redistribution & Salvage Branch, War Department; Benjamin Schwartz, formerly chief, Scrap Metals Section, Metals Div. of FEA; Stuart B. Sutphin, Jr., formerly chief, Waste Materials Section, Pulp Allocation Office of WPB; Leo Halpern, formerly of OWM; Wm. J. McCauley, administrative assistant, Rubber Reserve Corporation.

In view of the approaching Association Convention the Presidents of the Divisional Associations in the Organization were also invited in order that the Association's Staff might have the benefit of the advice of the entire group in making the coming Convention one of the most outstanding that the Association has held.

Sergt. Shapiro Opens His Agency

BOSTON, Mass., September 24, 1945—Joseph M. Shapiro, who was Staff Sergeant in the United States Army, entering the service in July, 1942, from Philadelphia, Pa., has been honorably discharged and has opened an office at 39 Hartford street, this city, to handle kraft papers and paper specialties under the name of Shapiro Paper Company. Before he went into the service, he handled paper specialties in Philadelphia for 14 years.

TAPPI Notes

George R. Wadleigh, formerly of the West Virginia Pulp and Paper Company, is now associated with Frederic C. Clark, Consulting Engineer, 7 Dey street, New York 7, N. Y.

Robert E. March, formerly of the Gaylord Container Company, has returned to the Institute of Paper Chemistry, Appleton, Wis., as a student.

George E. Soyka, formerly of Berkshire Cellulose and Paper Corporation is now assistant to the production manager of the Fonda Container Company, St. Albans, Vt.

K. C. Logan, formerly of Pacific Mills, Ltd., is now in the faculty of graduate studies at McGill University, Montreal, P. A.

P. M. Schaffrath, formerly of Moore Business Forms, Inc., is now chemical engineer for the Aetna Paper Company, Dayton, Ohio.

Russell J. LeRoux, formerly of the Weyerhaeuser Timber Company, Pulp Division, is now assistant to the president and director of sales of Rhinelander Paper Co., Rhinelander, Wis.

Gerald F. Alcorn is now manager of the Everett Division of Weyerhaeuser Timber Company, Everett, Wash.

The annual meeting of the Technical Section of the Canadian Pulp and Paper Association, will be held at the Mount Royal Hotel, Montreal, P. Q., on January 23-25, 1946.

Harold C. Koch, formerly of the Auglaize Box Board Company, is now research chemist for the Aetna Paper Company, Dayton, Ohio.

Edwin C. Jahn of the New York State College of Forestry, is now at the American Legation, Stockholm, Sweden, where he is temporarily attached to the U. S. Department of Commerce.

J. P. Scarratt has succeeded A. Haigh as representative of Brittains, Ltd., corporate member of the Technical Association.

R. G. Macdonald, Secretary of the Technical Association of the Pulp and Paper Industry, gave a two-hour lecture on the Economic Background of the Pulp and Paper Industry at the Polytechnic Institute of Brooklyn on October 4th. This is the first of a series of weekly lectures on pulp and paper technology given in the chemical engineering graduate school.

Running concurrently with the annual meeting of the Technical Association of the Pulp and Paper Industry during the week of February 25, 1946 will be the 20th Exposition of Chemical Industries to be held in the Grand Central Palace in New York City. The American Institute of Chemical Engineers will also meet during this week. It is urgent that all who expect to be in New York that week make their hotel reservations early.

The Technical Association would like to obtain copies of Technical Association Papers for 1941, 1942 and 1943, the Bibliography of Paper Making 1940 and the Paper Trade Journal for 1944 and first six months of 1945. Please write to the Association at 122 East 42nd street, New York 17, N. Y.

The Hudson River Group of the TAPPI Empire State Section will meet at the Queensbury Hotel, Glens Falls, N. Y., on Friday evening, October 19th at 6:30 p. m.

The Chicago Professional Paper Group will meet on Monday, October 15th, at the Chicago Bar Association, 29 So. La Salle street, Chicago, Ill. V. V. Vallandigham of The Kelco Company will talk on "The Effective Evaluation of Paper Surfaces for Printability."

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New York Paper and Pulp Market Review

Paper Demand and Production Continues Very High—Wood Pulp Supply Situation In Delicate Balance—Pulpwood Outlook Good—New and Old Cotton Rags Active — Paper Stock Demand Heavy.

Office of the PAPER TRADE JOURNAL,
Wednesday, October 10, 1945.

Paper demand continues active with over-all output the largest since 1941 as indicated in the production ratios given below. Inventories are so low that some time must pass before a good balance is attained. Current reports received from many manufacturers' representatives, jobbers, and general paper merchants, reflect increasing confidence in the return to normal conditions in the paper industry and trade. Upward adjustments in prices appear certain by OPA to effect an equitable balance. This expectation is indirectly indicated in the OPA amendment 7 to RMPR 187, certain paperboard products, of October 8, 1945. The agency states the revision was made to facilitate the transition to peacetime operations, allowing higher price ceilings to manufacturers of paperboard boxes and other containers made with higher-priced substitute materials and sold to civilian purchasers. A general revision and adjustment of most prices, in all lines, is clearly urgently required to accelerate the return to normalcy and to break new records in the future for many types of paper and paper products.

The index of general business activity for the week ended September 29 declined to 119.5, from 121.7 in the previous week, compared with 137.2 for the corresponding week in 1944. The index of paperboard production was 141.2 compared with 138.4 in the previous week, and compares with 144.5 for the corresponding week in 1944.

Paper production for the week ended September 29 was estimated at 97.0%, compared with 93.5% for 1944, with 91.7% for 1943, with 87.8% for 1942, and with 103.6% for the corresponding week in 1941.

Paperboard production for the week ended September 29 was 93.0%, compared with 95.0% for 1944, with 97.0% for 1943, with 80.0% for 1942, and with 100.0% for the corresponding week in 1941.

Pulpwood

Pulpwood receipts at the mills in August totaled 1,685,363 rough cords, compared with 1,580,423 cords in July and with 1,754,806 cords in August, 1944. This indicates an increase in August over July of 6.6%, but 4% lower than in August, 1944. Receipts decreased in all regions, except in the Northeast which increased 15.2%. Consumption declined in all regions, from 4.5% in the South to 16.1% in the Pacific Northwest, compared with August, 1944. Inventories declined from up 16.1% over last year, except in the Northeast where an increase of 9.2% was reported.

Wood Pulp

The wood pulp supply situation continues to be reported in very close balance, with production high. Inventories are at a low level, the total supply showing a decline of 6.9% in the first seven months of 1945 compared with 1944. Of the major papermaking grades the most severe decline was in unbleached sulphite which dropped 13.3% in the seven-month period.

Rags

Demand for new cotton cuttings is reported active this week. Buying continues steady. Inventories of rag stocks continue to be reported as very low. Total inventories for the seven-month period of 1945 were 21.3% below the corresponding period in 1944. Current prices are firm at ceiling levels.

Demand for old cotton rags is active at this date. With the removal of all building restrictions expected on October 15, increased demand for roofing products is looked for. All grades of roofing rags are in steady demand, including old whites, blues and cotton mattresses. Prices are steady at ceiling levels.

Old Rope and Bagging

Demand for Manila rope continues active, with mills absorbing all available supplies. Although some strong papers produced for war use are no longer required, supplies of Manila fiber are so limited that normal demand for standard strong fiber papers continues active. This condition is expected to continue until importation of Manila from the Philippine Islands is resumed in substantial volume.

Scrap bagging, some current reports state, is fair in some quarters of the trade, but the over-all state of trade is still slow. Labor shortage in sorting is reported to now restrict packings of gunny and mill run bagging. Supplies are relatively limited in these grades. Lacking any substantial interest in scrap bagging, as strikes have deferred purchasing by the automobile industry, the scrap bagging market is currently quiet. Prices are unchanged.

Waste Paper

Mill demand for waste paper continues active, with all grades currently in relatively heavy demand. Prices are quite strong at ceiling levels. Although the elevator operators strike caused a drop in the collection of waste paper in New York City, collections are expected to decline somewhat in the future because of lack of sustained interest in salvaging operations by the public and other non-trade sources. Collections in New York in September totaled 61,594 tons, compared with 61,716 tons in September, 1944. Collections in August aggregated 63,080 tons.

Carew Adds to Its Plant

HOLYOKE, Mass., October 6—The Carew Manufacturing Company of South Hadley Falls is building a two-story addition to its mill to house a new air drier. This is the first step in a long-range plant modernization program that is planned, Courtlandt B. Griffin, president of the Carew, announced today.

The management's objective is a more economical and efficient production of high-quality currency banknote and rag bond and ledger paper in which the Carew has specialized since 1848.

P. J. Kennedy has the contract for the new building which will be 140 by 30 feet. It will be of brick construction.

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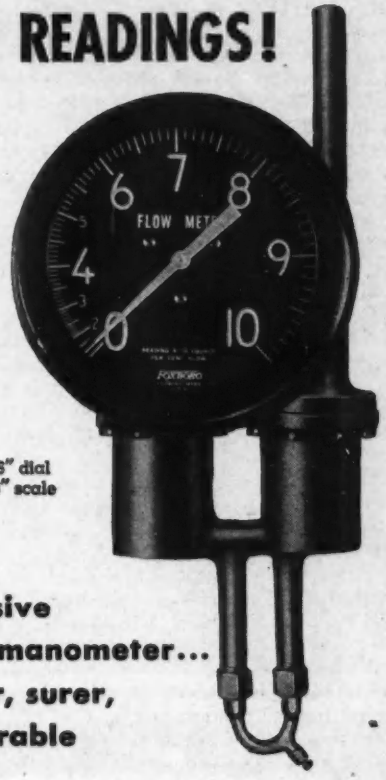

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DIAL FLOW METERS

MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL,
Wednesday, October 10, 1945.

BLANC FIXE—Quotations on blanc fixe continue unchanged. Demand is reported fair. The pulp is currently quoted at $40 per ton, in barrels, at works; the powder is currently quoted at $60 per ton, f.o.b. works.

BLEACHING POWDER—Current demand active. Supply situation improved. Quotations continue unchanged. Prices on bleaching powder range from $2.50 to $3.10 per 100 pounds, in drums, car lots, at works.

CASEIN—OPA maximum prices on processed acid-precipitated casein are as follows: 10,000 pounds or more, 24 cents per pound; 2,000 pounds, 24¼ cents per pound; less than 2,000 pounds, 24¾ cents per pound, f.o.b. shipping point. Imported 21 to 23 cents.

CAUSTIC SODA—Demand continues heavy. Deliveries continue delayed. Supply tighter in dry grades. Solid caustic soda is quoted at $2.30 per 100 pounds; flaked and ground is quoted at $2.70 per 100 pounds; all in drums, car lots, at works.

CHINA CLAY—Quotations on china clay are unchanged. Current demand is reported fair. Domestic filler clay is currently quoted at from $7.50 to $15 per ton; coating clay is quoted at from $12 to $22 per ton, at mine. Imported clay is quoted at from $13 to $25 per long ton, ship side.

CHLORINE—Demand heavy with essential requirements met. Quotations unchanged. Chlorine is currently quoted at $1.75 per 100 pounds, in single unit tank cars, f.o.b. works.

ROSIN—Fair offerings and sales. "G" gum rosin is quoted at $6.74 per 100 pounds, in barrels, at Savannah; "FF" rosin at $6.70 per 100 pounds in barrels, at New York; seventy per cent gum rosin size at $6.95 per 100 pounds, f.o.b. works.

SALT CAKE—Prices on salt cake are reported unchanged for the current week. Consumption is reported higher this week. Domestic salt cake is quoted at $15 per ton, in bulk. Chrome salt cake is quoted at $16 per ton. All prices in car lots, f.o.b. shipping point.

SODA ASH—Heavy demand continues for all-over requirements. Bulk lot shipments steady. Bagged lots still slow. Quotations continue unchanged. Current prices, car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Corn market unsettled by frost damage reports. Receipts lower. Prices less firm. Starch prices continue unchanged. The pearl grade is quoted at $3.72 per 100 pounds; powdered starch at $3.83 per 100 pounds; powdered starch at $3.83 per 100 pounds; all prices in bags, car lots, f.o.b. Chicago.

SULPHATE OF ALUMINA — Demand reported good. Quotations continue unchanged. The commercial grades are quoted at from $1.15 to $1.25 per 100 pounds, in bags, car lots, f.o.b. works. The iron free is currently quoted at $1.75 per 100 pounds, in bags, at works.

SULPHUR—Quotations on sulphur continue to conform to prevailing market prices. Demand active. Annual contracts are quoted at $16 per long ton, f.o.b. mines; the price at Gulf Ports is $17.50 per long ton.

TALC—Prices on talc continue unchanged. Demand good. Domestic grades are currently quoted at from $16 to $21 per ton at mines; Canadian at $24 per ton.

Whiting Elects Davidson

HOLYOKE, Mass., Sept. 27, 1945—At a meeting of the directors of Whiting & Company, Incorporated, held September 18, 1945, Charles Davidson, Jr., was elected vice president of the company.

MARKET QUOTATIONS

All market quotations, excepting those otherwise designated as official OPA maximum prices, are based on the manufacturers' price level as of October 1-15, 1941; maximum wholesale prices are based on the merchants' maximum prices for stipulated quantities at a quoted price to all customers of a like class, as shown by the merchant's sales records of goods delivered during March, 1942. A merchant's price list in effect in March 1942, showing quotations of actual shipments, will establish the current maximum prices.

Paper

(Delivered New York)

Standard News, per ton—			
Roll, contract	*$61.00	@	—
Sheets	69.00	@	—
*OPA Maximum Price.			
Kraft—per cwt.—Carload Quantities Zone A, Delivered			
Superstandard Wrapping	*$5.25	@	—
No 1 Wrapping	*5.00	"	—
Standard Wrapping	*4.75	"	—
Standard Bag	*4.375	"	—
*OPA Manufacturers' Prices.			
Tissues—Per Ream—Carlots			
White No. 1	1.12½	"	—
White No. 1 M. G.	1.10	"	—
White No. 1½	1.08	"	—
White No. 2	.90	"	—
Anti-Tarnish M.F.	1.20	"	—
Colored	—	"	—
Kraft	.95	"	—
Manila	.90	"	—
Toilet—1 M. Sheets—Per Case			
Unbleached	4.25	"	—
Bleached	5.70	"	—
Unbl. Toilet, 1 M.	4.16	"	—
Bleached Toilet	5.70	"	—
Paper Towels, Per Case—			
Unbleached, Jr.	2.20	"	—
Bleached, Jr.	3.20	"	—
Manila—per cwt.—C. l. f. a.			
No. 1 Jute	11.25	@	—
No. 1 Manila Wrapping, 35 lb.	6.00	"	6.25
Boards, per ton—			
News	*$0.00	@	—
Chip	*50.00	"	—
Sgl. Mla. Ll. Chip	*62.00	"	—
White Pat. Coated	*75.00	"	—
Kraft Liners 50 lb.	*63.00	"	—
Binders Boards	$4.00	"	116.00

*OPA Base Prices per 10 tons Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5.; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items. Delivered in Zone 1:

	Bonds	Ledgers
100% Rag Ext. No. 1	$39.10@$46.00	$40.25@$47.25
100% Rag	32.20 " 37.75	33.35 " 39.25
85% Rag	" "	29.90 " 35.00
75% Rag	23.00 " 27.00	24.15 " 28.25
65% Rag	" "	22.80 " 27.75
50% Rag	18.70 " 22.75	19.90 " 24.25
25% Rag	16.40 " 20.00	17.55 " 21.50

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items. Delivered in Zone 1:

	Bonds	Ledgers
No. 1	$10.55@$12.75	$11.70@$14.25
No. 2	9.65 " 11.75	10.80 " 13.25
No. 3	9.20 " 11.25	10.35 " 12.50
No. 4	8.90 " 10.75	10.05 " 12.25

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper. Delivered in Zone 1:

No. 1 Glossy Coated	$13.65	@$15.30
No. 2 Glossy Coated	12.40 "	14.00
No. 3 Glossy Coated	11.60 "	13.25
No. 4 Glossy Coated	11.15 "	12.75
No. 1 Antique (watermarked)	10.25 "	11.75
No. 2 Offset	9.60 "	11.00
A Grade E. F.	9.35 "	10.75
A Grade S. & S. C.	9.60 "	11.00
B Grade E. F.	8.85 "	10.25
B Grade S. C.	9.10 "	10.50
C Grade E. F.	8.55 "	9.75
C Grade S. C.	8.80 "	10.00
D Grade E. F.	8.25 "	9.50
D Grade S. & S. C.	8.50 "	9.75

Ivory & India at $.50 cwt. extra.

Wood Pulp

OPA Maximum Prices and Canadian Manufacturers Prices, Less Freight Not Exceeding OPA Allowances.

Bl. Softwood Sulphite		$86.00
Unbl. Softwood Sulphite		74.00
Bl. Hardwood Sulphite		83.50
Unbl. Hardwood Sulphite		71.50
Bl. Mitscherlich		81.00
Unbl. Mitscherlich	72.00 @	83.00
N. Bleached Sulphate		86.00
S. Bleached Sulphate		79.00
N. Semi-Bleached Sulphate		82.00
S. Semi Bleached Sulphate		75.00
N. Unbl. Sulphate		73.00
S. Unbl. Sulphate		69.50
Bl. Soda		76.00
Unbl. Soda		72.00
Groundwood		50.00

Transportation Allowances

Applying to Producers of Wet Wood Pulp.

	Below 50% Air Dry Weight
Northeast	$13.50
Lake Central	13.50
Southern	16.00
West Coast (in area)	10.50
West Coast (out area)	16.50

	50% 80% Air Dry Weight
Northeast	11.50
Lake Central	11.50
Southern	14.00
West Coast (in area)	9.50
West Coast (out area)	15.50

Applying to Producers of Dry Wood Pulp.

	Above 80% Air Dry Weight
Northeast	$8.50
Lake Central	8.50
Southern	11.00
West Coast (in area)	7.50
West Coast (out area)	13.50

Should freight charges actually exceed these allowances, the difference may be added to the maximum prices.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—		
New White, No. 1	6.50	@ 7.25*
Silesias No. 1	—	" 5.75*
New Unbleached	6.75	" 7.50*
Blue Overall	—	" 5.50*
Fancy	—	" 3.50*
Washables	—	" 3.00*
Bleached Khaki Cuttings	—	" 4.25*
Unbleached Khaki Cuttings	—	" 3.50*

*OPA Maximum Prices

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Old Rags

White, No. 1—			
Repacked	*3.80	"	—
Miscellaneous	*3.20	"	—
White, No. 2—			
Repacked	*2.90	"	—
Miscellaneous	*2.65	"	—
Thirds and Blues—			
Repacked	*2.20	"	—
Miscellaneous	*1.30	"	—
Roofing Rags—			
No. 1	*1.55	"	—
No. 2	*1.45	"	—
No. 3 (bagging)	*1.35	"	—
No. 4	*1.35	"	—
No. 5A	*1.35	"	—
Old Manila Rope	5.75	"	—

* OPA Maximum Prices.

Foreign Rags

Pre-War Quotations
All Prices Nominal

New Rags			
New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	"	2.20
New Light Silesias	5.50	"	5.75
Light Flannelettes	5.50	"	5.75
New White Cuttings	7.00	"	7.50
New Light Oxfords	4.00	"	4.50
New Light Prints	3.00	"	3.25
Old Rags			
No. 1 White Linens	7.50	"	8.50
No. 2 White Linens	6.50	"	7.50
No. 3 White Linens	4.50	"	—
No. 4 White Linens	2.25	"	3.25
No. 1 White Cotton	4.25	"	4.75
No. 2 White Cotton	3.25	"	3.75
No. 3 White Cotton	2.50	"	3.00
No. 4 White Cotton	1.90	"	2.20
Extra Light Prints	2.00	"	2.40
Ord. Light Prints	1.75	"	2.15
Med. Light Prints	1.55	"	1.95
Dutch Blue Cottons	2.25	"	2.50
French Blue Linens	3.00	"	—
Checks and Blues	2.00	"	—
Linsey Garments	1.90	"	2.00
Dark Cottons	1.50	"	1.60
Old Shopperies	1.30	"	1.45
New Shopperies	1.45	"	1.50
French Blues	2.25	"	2.50

BAGGING

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	3.25	@	3.30
Wool Tares, light	3.25	"	3.50
Wool Tares, heavy	3.50	"	3.75
Bright Bagging	3.25	"	3.50
Manila Rope—			
Foreign	—	"	—
Domestic	*5.75	"	—
Jute Threads	5.50	"	—
No. 1 Sisal Strings	*4.00	"	—
Mixed Strings	2.00	"	—

* OPA Maximum Prices.

Old Waste Papers

(F. o. b. New York)
OPA Maximum Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Envelope Cuts	3.12½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, one cut	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Mixed Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
Mixed Groundwood Colored Shavings	.90	"	—
Overissue Magazines	1.67½	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
Mixed Books	1.10	"	—
No. 1 White Ledger	2.30	"	—
No. 2 Mixed Ledger, colored	2.00	"	—
New Manila Envelope Cuttings, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
Extra Manilas	1.95	"	—
Mixed Kraft, Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
Triple Sorted, No. 1 Brown Soft Kraft	2.50	"	—
New 100% Kraft Corrugated Cuttings	2.25	"	—
No. 1 Assorted Old Kraft	1.75	"	—
New Jute Corrugated Cuttings	.90	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.40	"	—
Box Board Cuttings	.72½	"	—
White Blank News	1.65	"	—
Overissue News	1.10	"	—
No. 1 News	1.00	"	—
No. 1 Mixed Paper	.95	"	—
Old Corrugated Containers	.82½	"	—
Mill Wrappers	1.10	"	—

Twines

All Prices Nominal
(F. o. b. Mill)
(Soft Fiber)

Coarse Polished—			
India	.21	@	—
White Hemp	.21	"	—
Fine Polished—			
Fine India	.26	"	—
Unpolished—			
Box	.17½	"	—
Paper Makers	.17	"	—
Tube Rope	.19	"	—
Wall Paper	.20½	"	—
Wrapping	.21	"	—
Soft Fiber Rope	.19	"	—
Cotton	.25	"	—
(Hard Fiber)			
Medium Java	.18	"	—
Mex. Sisal	.16	"	—
Manila	—	"	—

PHILADELPHIA

Domestic Rags (New)

(Price to Mill)

Shirt Cuttings—	
New White No. 1	.07¼
New White No. 2	.05¼
Light Silesias	.05¾
Black Silesias, soft	.03¾
New Unbleached	.07½
Washable Prints	.04¼
Washable No. 1	.03
Blue Overall	.05½
Cottons—According to grades—	
Washable Shredding	.01¾
Fancy Percales	.04¾
New Black Soft	.03¾
Khaki Cuttings—	
Unbleachable Cotton Cuttings	.03½
Bleachable Cotton Cuttings	.04¼
Men's Corduroy	.03½
Ladies' Corduroy	.03
Cretonades	.03¼

Domestic Rags (Old)

White No. 1—Repacked	3.80	@	—
Miscellaneous No. 1	3.20	"	—
Miscellaneous No. 2	2.65	"	—
White No. 2—Repacked	2.90	"	—
Thirds and Blues—			
Miscellaneous	1.80	"	—
Repacked	2.20	"	—
Black Stockings—			
(Export)	Nominal		
Roofing Stock—			
Foreign No. 1	Nominal		
Domestic No. 1	1.55	"	—
Domestic No. 2	1.45	"	—
Roofing Bagging	1.35	"	—
Old Manila Rope	5.75	"	—

Bagging

(F. o. b. Phila.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	3.00	@	3.50
No. 1 Clean bright—			
Sisal Strings	.04	"	—
No. 2 Clean bright—			
Sisal Strings	.03	"	—
Sisal Jute	.02½	"	.02¾
Scrap—			
No. 1	3.25	"	3.50
No. 2	1.75	"	1.80
Wool Tares, heavy	4.00	"	4.25
No. 1 New Light Burlap	3.00	"	4.00
New Burlap Cuttings	3.75	"	4.00

Old Papers

(F. o. b. Phila.)
OPA Maximum Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	3.37½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
Soft White Shavings, one cut	2.50	"	—
White Blank News	1.65	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 White Ledger	2.30	"	—
No. 2 Ledger, colored	2.00	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
Overissue Magazines	1.67½	"	—
New Manila Envelope Cuttings	2.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.95	"	—
Box Board Cuttings	.72½	"	—
Kraft Corrugated Cuttings	2.25	"	—
Old Corrugated Containers	1.40	"	—
Overissue News	1.00	"	—
No. 1 News	1.00	"	—

BOSTON

Old Papers

(F. o. b. Boston)
OPA Maximum Prices, Baled

No. 1 Hard White Shavings, unruled	2.87½	@	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
Hard White Envelope Cuts, one cut	3.37½	"	—
Triple Sorted No. 1 Brown Soft Kraft	2.50	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
White and Colored Tabulating Cards	2.25	"	—
Ground Wood Tabulating Cards	1.35	"	—
White Blank News	1.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.95	"	—
Overissue News	1.10	"	—
Box Board Cuttings	.72½	"	—
New Corrugated Cuttings, Kraft	2.25	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.40	"	—
Jute Corrugated Cuttings	1.07½	"	—

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	(nominal)		
Domestic	2.75	@	2.90
Sisal Rope No. 1	*4.75	"	—
Sisal Rope No. 2	* —	"	4.00
Mixed Rope	—	"	1.55
Transmission Rope—			
Foreign	(nominal)		
Domestic	2.75	"	3.00
Manila Rope—			
Foreign	(nominal)		
Domestic	5.75	"	—
Soft Jute Rope	4.50	"	5.00
Jute Carpet Threads	3.00	"	3.50
Bleachery Burlap	8.50	"	9.00
Scrap Burlap—			
Foreign	(nominal)		
Domestic	3.00	"	3.25
South American	—	"	3.25
Wool Tares—			
Foreign	(nominal)		
Domestic	4.25	"	—
Aust. Wool Pouches	—	"	3.65
New Zealand Wool Pouches	—	"	3.50
New Burlap Cuttings	4.75	"	5.00
Heavy Baling Bagging	4.00	"	4.25
Paper Mill Bagging	2.50	"	3.00
No. 2 Roofing Bagging	1.35	"	—

* OPA Maximum Prices.

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.04½	@	.04¾
Fancy Percales	.04¼	"	.05
New White No. 1	.06¾	"	.07
New Light Flannelettes	.05½	"	.06
Canton Flannels, Bleached	.06	"	.06¼
Underwear Cutters, Bleached	.06¾	"	.06¼
Underwear Cutters, Unbleached	.05¾	"	.06
Silesias No. 1	.06	"	.06¼
New Black Silesias	.03	"	.03¼
Red Cotton Cuttings	.03½	"	.04
Soft Unbleached	.06½	"	.06¾
Blue Cheviots	.05½	"	.06
Fancy	.02¾	"	—
Washable	.02¾	"	—
Khaki Cuttings	.02¾	"	.03
O. D. Khaki	.03½	"	.03¾
Corduroy	.03¼	"	.03¾
New Canvas	.06¼	"	.06¾
B. V. D. Cuttings	.06¾	"	.06¾

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	3.80	@	—
Miscellaneous	3.20	"	—
White No. 2—			
Miscellaneous	2.65	"	—
Twos and Blues, Repacked	2.20	"	—
Old Blue Overalls	2.25	"	2.50
Thirds and Blues, Repacked	2.20	"	—
Miscellaneous	1.80	"	—
Black Stockings	3.50	"	4.00
Roofing Stock—			
No. 1	1.55	"	—
No. 2	1.45	"	—
No. 3	1.15	"	—
No. 4	1.35	"	—
No. 5, Quality A	1.35	"	—
Quality B	1.20	"	—
Quality C	.95	"	—
Old Manila Rope	5.75	"	—

* OPA Maximum Prices.

Foreign Rags

(F. o. b. Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)
OPA Maximum Prices, Baled

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
No. 1 White Ledger	2.30	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
White Blank News	1.65	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
No. 1 Assorted Old Kraft	1.75	"	—
Overissue News	1.10	"	—
No. 1 News	1.00	"	—
No. 1 Mixed Paper	.95	"	—
No. 1 Roofing Rags	1.55	"	—
No. 1 Roofing Bags	1.45	"	—

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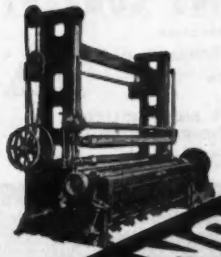

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Electrical Engineering graduate, 2530 years old preferred, experienced in design and layout of electrical power plant, substations, conduit and wiring layouts for lighting and power.

General Layout on Process Equipment
Technical graduate, 25-30 years old preferred. Experienced in general layout of pulp and paper mill equipment, process piping, pumps, tanks and conveyors.

These positions all offer opportunities for advancement in our large Pulp and Paper Mill.

Please reply in detail. State salary desired and when available.

Industrial Relations Department
HAMMERMILL PAPER COMPANY
Erie, Pa. O-11

WANTED—Graduate Chemist with at least 1 yr. experience in a paper mill for research and development work in a well established chemical house in Western Pennsylvania. Excellent opportunity to get into Sales and Technical Service. Apply in own handwriting giving references, experience and personal history. Address Box 45-589 care Paper Trade Journal. O-11

MERCHANDISE AND SALES MANAGER for nationally known paper bag manufacturing company seeking to develop sales of special purpose and transparent bags and flexible containers—opportunity—replies considered in strictest confidence—state experience and minimum compensation. Our employees aware of this advertisement. Address Box 45-529 care Paper Trade Journal TF

SALES ENGINEER with knowledge of Pulp and Paper Machinery and experience in merchandising. Write giving background, references and salary expected. Address Box 45-606 care Paper Trade Journal. TF

WANTED—Man to represent an Eastern Paper converting mill throughout the New England States. We will prefer one who has had some experience with the jobbing trade in this area, and who resides in the vicinity of Boston, Mass. Address Box 45-616 care Paper Trade Journal. TF

WANTED—Layout Man experienced on pulp and paper mill machinery. Give employment history and background in first letter. Valley Iron Works Co., Appleton, Wisconsin. N-1

WANTED—A Machine Tender on a Fourdrinier Machine. This machine will run between three hundred (300) and nine hundred (900) feet a minute. Address Box 45-619 care Paper Trade Journal. TF

WANTED—Experienced paper mill engineer, capable of handling maintenance, reconstruction, etc. College graduate preferred but not essential. Keuka Paper Corporation, Penn Yan, N. Y. O-18

OLD ESTABLISHED dual paper house is seeking the services of an experienced energetic specialty salesman as manager of a new department covering Paper Products and Specialties. In reply state experience and former connections. Address Box 45-649 care Paper Trade Journal. O-11

WANTED—Chief Engineer with paper mill experience. Must be good at repairing boilers and engines. For Paper Mill in Eaton, Indiana. State experience in first letter. Reply to Sangamon Paper Mills, 3915 S. La Salle Street, Chicago, 9, Ill. O-11

IT ALWAYS PAYS TO KNOW THE SCORE

Here are some hydrapulper scores that should interest you.

Close to 100 hydrapulpers have been installed to date, bringing about a veritable revolution in the pulping of virgin pulps and mixed paper stocks.

As effective as were the first hydrapulpers built, perfection is never achieved on the first try, and hydrapulpers afforded no exception to that unfailing rule.

The drive was too light. Today's hydrapulpers have far heavier drives.

Plate wear was too rapid. Inclined plate extractors now employed.

Concrete tub bottom washed out too fast. All-iron tub with cast-iron bottom overcame that difficulty.

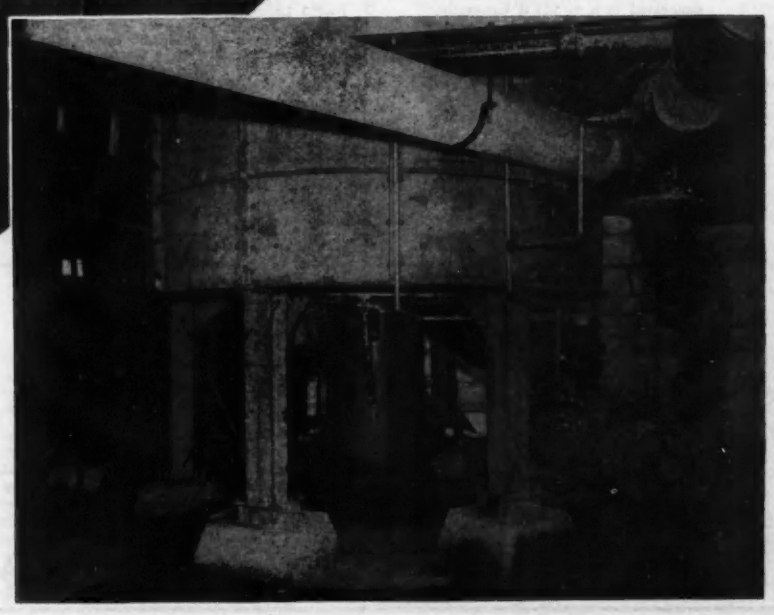
Today there are 90 odd additional hydrapulpers on order — shipment to go forward as fast as materials and labor become available.

If your hydrapulper, or hydrapulpers, are on order, fine; if not—prompt action would be to your advantage.

THE

BLACK-CLAWSON CO., Hamilton, Ohio

Divs.: *Dilts Machine Works, Fulton, N. Y.*
Shartle Bros. Machine Co., Middletown, O.
Associate: *Alexander Fleck Ltd., Ottawa, Canada.*



SHARTLE Dilts

HELP WANTED

PAPER SLITTING MACHINE Operators on Adding Machine and Teletype Rolls. Plant located in Chicago. Opportunity for advancement. High wages, steady work, overtime. Address Box 45-648 care Paper Trade Journal. O-25

WANTED—Graduate mechanical engineer to take complete charge of large modern high pressure power plant. Location Middle. West Please state age, experience and salary expected. Address Box 45-644 care Paper Trade Journal. O-25

BEATER ENGINEERS—Old established Southern California mill has an opening for two experienced beater engineers. Write full particulars. Address Box 45-638 care Paper Trade Journal N-1

SITUATIONS WANTED

MACHINE DESIGNER

Many years experience paper converting machinery. All types printing machinery, paper bag machinery, compensating devices, cellophane converting machinery, die cutting, sheer cutting, roll winding, automatic sheet feeding as well as many other types converting machinery. Plant management. Sales promotion and technical service to the trade. Seeks connection commensurate with ability. Address Box 45-632 care Paper Trade Journal. O-11

CHIEF CHEMIST of a Southern Kraft Paper Mill, with diversified experience desires change in same or allied industry. Address Box 45-623 care Paper Trade Journal. O-11

SITUATIONS WANTED

PAPER SALESMAN at present covering the jobbing trade in Pennsylvania, New Jersey, Delaware, Maryland, Virginia and North Carolina as a mill representative desires to operate over the same territory as a representative for three of four non-conflicting lines. Address Box 45-435 care Paper Trade Journal. O-25

PAPER MILL ENGINEER MILL SUPT.

20 years various mills. Experienced all phases administration, production, operation, development, reconstruction. Good organizer. Desires change. Personal reasons. Seeking opportunity to manage mill. Replies confidential. References. Address Box 45-566 care Paper Trade Journal TF

SPECIALTY PAPER BAGS

Plant management. Machinery design and development. Production control systems. Personnel training. General organization work. Thoroughly familiar with all types bag making. Latest developments in printing cellophane converting and many other related items. Wishes to become associated with live wire progressive organization Excellent record of past performance. Address Box 45-625 care Paper Trade Journal. O-11

SITUATIONS WANTED

POSITION WANTED

Executive, 25 years experience covering the management of mills. Re-designing and building all types of machines for higher speeds, converting and general engineering. Field covers all types of machines, making all grades of tissue. Temperate and of high character. Any replies to this advertisement, will be kept in the strictest confidence. Address Paper Trade Journal, Box 45-643. O-25

TEXAS-LOUISIANA. Spade work in this market for quality printing paper should begin now. Write resident, 32, college graduate, publicity and graphic arts experience, to discuss sales representation. Address Box 45-585 care Paper Trade Journal. O-11

SALES—SERVICE, PAPER, CHEMICALS. Young technical graduate desires permanent location with progressive chemical manufacturer. Ten years experience in trade with chemicals and resins. Able technician with proven sales record. Address Box 45-639 care Paper Trade Journal. O-11

AVAILABLE. Man capable of taking complete charge of gummed tape manufacturing. Also allied products. Address Box 45-654 care Paper Trade Journal. O-25

MECHANICAL ENGINEER—Experienced as Plant Engineer, Chief Engineer and Mill Manager, all grades of paper, board, pulp and converting plants. 20 years experience. Address Box 45-650 care Paper Trade Journal. O-11

FOR SALE

BEATERS
2—2000 lb. Holyoke Iron Tub Beaters.
1—1000 lb. Dayton Beater.
2—400 lb. Gavit—iron tub beaters.

CALENDER STACKS
1—11-Roll 92" Face Calender Stack—complete with Drive.
1—36" 7-roll—Holyoke Machine
1—60" 4-roll Downingtown (heavy duty).
1—77" 2 roll—Moore & White.
1—76" 8-Roll Farrel.

CENTRAP
1—Shartle Brothers Centrap.

CONVEYORS
650'—3½" Roller Conveyor Section—18"x10'.

CYLINDER MOULDS
1—48" Diameter x 96" face.
8—30" diameter x 72" face.
3—30" diameter x 74" face.

DIESEL ENGINE
1—60 H.P. Fairbanks Morse Diesel Engine, connected to a 40 KVA Generator.

DRIVES
1—D. O. James 75 H.P. Speed Reducer with couplings and motor base. Ratio 2.16 to 1. 900 RPM to 418 RPM.
1—Pulmax Drive.
1—#7½ Reeves Drive.

DRYERS
23—36" diameter x 82" face.
12—36" diameter x 68" face.
13—60" diameter x 154" face.
1—48" diameter x 94" face.
1—24" diameter x 84" face. (Baby).
1—16" diameter x 84" face. (Baby).
1—36" diameter x 116" face.
2—28" diameter x 68" face.

EMBOSSER
1—28" two roll Embossing Calender.

ERKENSATORS
2—I. W. E. Erkensators—bronze construction—complete with motors, starters and distributing box.

FLAT SCREENS
2—8 plate Flat Screens.
1—18 plate Flat Screen, with scraper.
1—12 plate Flat Screen.
2—12 plate Packer Type Flat Screens with steel vats

JORDANS
1—#2 Miami Jordan.

JORDANS
1—Pony Horne Jordan. Spare New Fillings.
1—Black-Clawson Jordan (belt driven).
1—#9 Emerson Jordan—for direct connection of a motor — requires use of 400 H.P. motor
1—Smith & Winchester.

MOTOR
1—150 H.P. G. E. Induction Motor—3/60/220-875 r.p.m.—including starting equipment.

PULP EQUIPMENT
1—84" Carthage Chipper—complete and in excellent condition.
1—32" three pocket Glens Falls Grinder (for 27" wood).
3—Rotary incinerators—9' diameter x 20' long.
4—27" four pocket Sandy Hill grinders (for 24" wood—including 1000 H.P. motor for each, starting equipment, etc.).

PULPERS
1—#2 Lannoye Pulper.
1—Jones Pulper — direct connected to 60 H.P. motor—3 phase, 60 cycle, 440 volts —forward and reverse starting.

PUMPS
1—Buffalo Pump—5500 g. p. m., direct connected to 100 H.P. Motor (50' head).
1—Shartle Brothers duplex 10 x 20 stock pump.
1—Moore & White triplex 10 x 12 stock pump.
3—Worthington Turbine Well Pumps—300 g.p.m. for 14' and 16' depths—with motors.
Various sizes of Centrifugal and Plunger Pumps. Write us regarding your particular requirements.

REELS
1—2 Bowl Reel — 112" face — bowls 20" diameter.
1—2 Bowl Reel—63" face.
1—2 Bowl Reel—110" face.
1—2 Drum Reel—72" face.

REFINERS
2—#1 Claflin Refiner

ROLLS
500—Brass tube—steel tube—rubber covered iron rolls—various sizes

RUBBER COUCH ROLL
1—72½" Face x 9" diameter (soft rubber)

SAVEALL
1—Saveall 36" x 136" cylinder mold, anti-friction bearing equipped, including couch roll.

SCREW PRESS
1—Valley Iron Screw Press.

SHREDDERS
1—#25 CRSE Mitts & Merrill Hog.
1—Gilman Shredder—used one year.

SHEETERS
1—103" Hamblet Single Knife Sheeter, complete with slitting device.
1—100" Horne single knife rotary sheet cutter.
1—48" Langston heavy duty chopper (this is a combination machine, combining a slitter, scorer, sheeter and chopper.)

SIZING MACHINE
1—36" Waldron sizing machine.

SLITTERS
1—60" Hudson Sharp two shaft Slitter & Winder.
1—72" Kidder two drum Slitter & Winder.
1—114" Two drum Langston Slitter & Winder.
1—110" Beloit slitter (slitter attachment only).
1—114" Two drum Kidder slitter and winder.
1—36" Koegel slitter and winder
1—72" Moore & White shaft winder.
1—4 Drum 108" trim Moore & White.

STACKER
1—Lewis Shepard—1000 lb. capacity—12' lift—motor included—Equipped with safety devices

STEAM ENGINE
1—100 H. P. Ames Steam Engine connected to a 75 K. W. Westinghouse Generator.

SUCTION BOXES
1—Nash 100" face Suction Box.
3—Brass Suction Boxes—90" drilled face.
2—Brass Suction Boxes—77½" drilled face.

SUCTION COUCH ROLL
1—Sandusky Suction Couch Roll — 18" diameter x 130" face — Complete with Sturtevant Vacuum Pump and drive mechanism.
1—Downingtown Suction Press Roll 24" x 92".

TOILET CONVERTERS
2—63" Dietz Toilet Converters.
1—81" Dietz Toilet Converter.

WINDERS
2—65" Cameron Tensions for Winders.

We are always in the market to purchase your surplus or idle machinery. What have you to offer?

Wanted Cylinders and Fourdrinier Machines (complete mills). What have you to offer?

J. J. ROSS CO., 250 Frelinghuysen Avenue, Newark 5, New Jersey
TEL. BIGELOW 3-3720 O-11

FOR SALE | FOR SALE | FOR SALE

Ross Paper Machinery Co., 265 Passaic St., Newark 4, N. J., Humboldt 2-2177

48" Single Cylinder Complete Mill with all auxiliaries.

Additional Information on request.

BEATERS
1—2500 lb. Downingtown Iron Tub
1—750 lb. Downingtown Iron Tub
2—1000 lb. Horne Iron Tub
1—1200 lb. Holyoke Wood Tub

CALENDER STACKS
1—10 Roll Farrell 104" Warren Doctors
1—11 Roll Pusey & Jones 104" Warren Doctors

CONVERTING EQUIPMENT
1—Bliss Double Head Stitcher
1—Bliss Single Head Stitcher
1—Bliss Box Assembling Machine
1—60" Dietz Towel Winder
4—Waterville Grinders
1—36" Waldron Reeling Machine
1—39" Dampening Machine
1—46" Brush Coating Machine
1—Copper Mixing Tank with agitator—40 gal.
1—Cast Iron Kettle 20" x 24" 2 outlets

CONVEYOR
1—Standard Conveyor 30' long on wheels for handling bales of pulp. Direct connected to 5 h.p. motor.

DRYERS
4—60" diameter x 174" face framed and geared.
1—36" diameter x 102" face with bearings.
19—36" diam. x 68" face—2 deck frames, gears, bearings, etc.
5—48" diam.—102" face—2 deck frames.
40—36" diam. 86" face 3 deck frames
18—36" diam. 82" face 2 deck frames
40—28" diam. 96" face 2 deck frames

FESTOON DRYERS
100" Proctor & Schwartz
60" Proctor & Schwartz

FLAT SCREENS
1—Moore & White 8 Plate
1—Moore & White 10 Plate
3—Sandy Hill Packer 8 Plate with Scrapers.
1—Sandy Hill Packer 10 Plate
1—Trimbey Pulp Screen 30 ton cap.

JORDANS
1—E. D. Jones Standard motor drive
1—Dillon No. 2 Motor drive
1—Appleton No. 2 motor drive

KNIFE GRINDER
1—72" Seybold automatic used one year

MISCELLANEOUS
1—Warren Broke Target with pump
2—Yankee Dryer doctor oscillators (Beloit)
2—Nugent Oil Filters (new)
2—Beloit Fourdrinier Shakes

MOTORS
5—1000 h.p. motors, 2300 volts with all controls.
1—30 h.p. 600 R.P.M. 2300 V. 3 Ph. 60 cy.
1—40 H.P. 3600 R.P.M. 2300 V. 3 Ph. 60 cy.

PLATERS
2—Holyoke 2 Roll 18" dia. 36" face

PULLEYS
185—Cone Lift and Solid Cast Iron Pulleys. *Various Sizes.*

PULP EQUIPMENT
Complete Ground Wood Mill—
1—Sandy Hill four pocket Grinders. Each direct connected to 1000 h.p. motor, 2300 volts. 27" stones. Spare stones, etc. Excellent condition. Will sell all or part.
2—Pusey & Jones vertical Digesters (welded) 7' dia., 24' high 125 lb. pressure
8—Horizontal Digesters 15' diam. 47' face 150 lb. pressure
2—Improved No. 2 Knotters
1—Nichols-Herreshoff Lime Kiln
1—Williams No. 30 Bark Hog
1—Sumner Disc Barker 72" dia.
1—36" Bauer Bros. Single Revolving Disc Mill. Direct connected to 50 h.p. motor, 3 phase, 60 cycles, 220 volts, 1160 r.p.m.

PULPERS
1—Sturtevant Bale Pulper with conveyor & motors used three years.
1—Voith Pulper No. 1-20 tons cap.

PUMPS
1—Pusey & Jones 5" x 8" Stock.
1—DeLaval 6" x 6"
1—Oliziti Acid 3" Suction.
1—Frederick 600 g.p.m. 50' head (stock)
1—Midwest 6" stock pump

REELS
2—Pusey & Jones 104" face 18" dia. bowls
1—Pusey & Jones 115" face 18" dia. bowls
1—2-bowl 100" face 20" dia. bowls

RIGHT ANGLE WORM GEAR DRIVES
1—Cleveland 2 H. P.—10 to 1 ratio.
1—Philadelphia 15 H. P.—60 to 1 ratio.
1—Oliver 3 H. P.—51 to 1 ratio.
1—Grant 2 H. P.—33½ to 1 ratio.
1—Cleveland 2.3 H. P.—40 to 1 ratio.
1—Cleveland 1.2 H. P.—60 to 1 ratio.
1—Grant 2 H. P.—7 to 1 ratio.
1—Philadelphia 2 H. P.—600 to 1 ratio.
1—Philadelphia 15 H. P.—50 to 1 ratio.

ROLLS
315—Table, Dress, Felt, Wire, Breast and Calender Rolls. *Various Sizes.*

SATURATOR
1—Guyton-Cumfer 5 gates

SAVEALL
1—A. D. Wood cylinder 48" dia. 60" face
1—No. 4 Bird with motor and speed reducer 16" diam. rubber couch.

SHEET CUTTER
120" Hamblet Duplex with layboy and 24 roll backstand.

SLITTERS & WINDERS
1—104" Warren two drum.
1—72" Pusey & Jones two drum.
1—50" Cameron 6—20 slitters with motors.

STOKERS
2—Iron Firemen Pneumatic Spreader Stokers for two—300 h.p. boilers. Complete with undergrates, fans, sly ash fans, weight lory, portable car unloader. All direct connected to motors with starters. Used 1 year.

STUFF PUMPS
1—12" x 12" Goulds triplex
6—10" x 20" Shartle triplex
1—8" x 18" Shartle triplex
1—12" x 16" Shartle triplex
1—8" x 10" Shartle triplex
1—7" x 16" Shartle triplex
1—8" x 18" Shartle duplex

TURBINES
1—Westinghouse Turbine Generator 3125 KVA—600 volts—3 phase—60 cycle—30 lb. back pressure.
1—General Electric Turbine Paper Machine Drive. 250 h.p.—350 r.p.m. 125 lb. steam pressure.

TWISTING MACHINE
1—36 Spindle Brownell Twister with motor.

UNWINDERS
1—52" Johnstone Uniform Tension Unwinder with auto, hydraulic brakes. Used 6 months.
1—42" John Waldron Unwinder. Used 1 year.

VACUUM PUMPS
1—14" x 20" Connersville
1—12" x 18" Connersville

WASHERS (Beaters)
1—54" face—48" diam. with rigging
1—52" face—52" diam. with rigging

WELL PUMP
1—A. D. Cook 100 g.p.m. 175' head, 70 feet in well 6" drop in pipe—5¾" bronze double acting cylinder. Direct connected to 10 h.p. motor.

YANKEE DRYER
1—Beloit 186" face 12' diameter with Messinger Bearings.

AMERICA'S LARGEST BUYERS OF PAPER MAKING MACHINERY

SPECIAL ATTENTION TO THE INDUSTRY

New Cut Tooth Gears—Standard or made to your specifications. All sizes. Quick delivery. Priced unusually low. All inquiries will be given immediate attention.

SITUATIONS WANTED

PERSONNEL DIRECTOR—Broad industrial experience. B.A. and L.L.B. Degrees. Extensive union negotiations background. Experienced in all phases employer-employee relationships including job evaluations etc. Address Box 45-561 care Paper Trade Journal. O-11

CHEMICAL ENGINEER—M.I.T., expert in board, straw, nine point corrugating processes, formulations, available full time or on consultation basis. Address Box 45-641 care Paper Trade Journal. O-25

PAPER CHEMIST with wide and varied experience, seeks position with fiber board company that makes coated and general grades of board. Address Box 45-640 care Paper Trade Journal. O-25

SITUATIONS WANTED

MECHANICAL ENGINEER—Paper, pulp and Boardmill experience. Professional and Structural Engineer. Design, construction, cost estimates, steam and power utilization, heat balances, economic studies, process work. Can take charge of post war development. Address Box 45-627 care Paper Trade Journal. O-18

PLANT ENGINEER with 18 years experience in supervision, production, research, maintenance, construction and power in fine papers, pulp and paper insulboard mills. Wants to change to a mill in or near New England. 40 years old. Technical graduate. Development work desired. Address Box 45-637 care Paper Trade Journal. O-25

SITUATIONS WANTED

CHEMIST—Experienced in all phases of manufacture of surface coated and fancy printed papers, including the finishing operations. Desire to make permanent connection with company engaged in paper coating or in allied field. Address Box 45-601 care Paper Trade Journal. O-11

FOR SALE

FOR SALE—1 Hamilton-Corliss Variable Speed Twin Engine, size of cylinders 12" x 24". Also Triple-Deck Frames for ninety 36" dryers, any width. The Chesapeake Paperboard Co., Baltimore, 30, Md. TF

FOR SALE

FOR SALE

3—Worthington turbine well pumps, 300 g. p. m.—for 14' and 16'—with motor.

J. J. ROSS COMPANY
250 Frelinghuysen Ave.
Newark 5, N. J.
Bigelow 3-3720 O-11

FOR SALE

50" Waldron 6-Roll Brush Coater & 64" Rewinder.
42", 72" Automatic Power Paper Cutters with new knives.
32", 40", 52" Single & Double Roll Coaters.
14"x22", 26"x36" Thomsen & 30"x50" Cottrell Die Cutters.
45", 50", 56" MIEHLE Printers—or can be converted to Die Cutters.
15½"x18" Seybold 4-Post Embosser, with Elec. Heat. Attach.
ALSO CREASERS, SLITTERS, GLUERS, BOX STITCHERS, WRAPPERS, ENDERS, CORNER CUTTERS, SLITTERS & REWINDERS—all in many sizes and makes. All offered REBUILT & GUARANTEED. Write for Bulletin No. 124. Listing over 100 Paper & Board Converting Machines—now on our floor.

SOUTH WABASH ENGINEERING CO.
2937 South Wabash Ave.
CHICAGO, ILLINOIS N-8

REVAMPING AND BUILDING MILL AND CAN OFFER FOR SALE

One large Breaker Beater complete
One small Beater Complete
1—30" Diameter X 90" Face cylinder mold
1—2x8 Shartle Duplex plunger stock pump
1—New pair cast steel double suspension spring type beater bearings for 8" diameter journal—Noble & Wood beater roll. Never used
1—Used old style lighter beam for 8" diameter journal Noble & Wood beater
1—New reinforced design lighter beam for 8" diameter journal—Noble & Wood beater roll. Pattern No. 663. Never used.
3—200 KVA —33000-2300/4600 volts transformers
80—92" Face steel dryer felt rolls—1—7/16" journals.
1—30" Face cast iron taper pulley—2 15/16" bore taper 31"x29½"
4—36" diameter x 83" face dryers
1—6" to 10" Cox & Sons Pipe threading machine
1—40" Noble & Wood impeller for circulation stock in beater.

A visit to the mill would prove profitable as we have many items for sale to numerous to mention. See our superintendent Mr. O. P. Fussell at our plant in Walloomsac, New York.

WALLOOMSAC PAPER MILLS, INC.
Mills: Walloomsac, New York
Main Office: 25 Vanderbilt Avenue
New York 17, New York TF

FOR SALE

1—E. D. Jones Standard Jordan with 5/16" solid steel fillings and extra new plug filling, directly coupled to 200 hp. G.E. AC motor. Capacity 60 tons 24 hours. A-1 condition.
1—#2 Lamoyo Pulper complete with 40 H/P A.C. motor equipment. A-1 condition.
1—110" Double-Drum Waldron late type shear cut hydraulic Slitter and Rewinder.
1—60" Double re-wind Hudson-Sharp shear cut slitter and rewinder suitable for board work.
1—48" seven-roll stack of Holyoke Super Calenders complete with 50 h.p. AC motor equipment.
1—Shartle & Bevis Shredder suitable for shredding tissue in ½" widths.
1—45" up-to-date Beck Rotary Sheet cutter complete with automatic Beck Layboy.
1—34" up-to-date practically new Waldron Embossing Machine with leather design.
2—Laminating machines—one 36" Cameron and one 44" Run Brewer.

GIBBS-BROWER COMPANY, INC.
21 East 40th St., New York 16, N. Y.
TF

FOR SALE

FOR SALE

Complete two cylinder Paper Mill presently in operation. 150 miles New York City.

Additional details on request.

J. J. ROSS COMPANY
250 Frelinghuysen Ave., Newark 5, N. J.
Bigelow 3-3720 O-11

FOR SALE

36" Diameter Dryers 85" and 86" Face — 3 Deck — Complete with Stands, Gears and Bearings.

EMPIRE BOX CORPORATION
Garfield, New Jersey
TF

PAPER MILL & PAPER CONVERTING EQUIPMENT FOR SALE

34" Inman Slitter
42" Firsching Cloth Slitter
36" Sheridan Automatic Power Paper Cutter.
44" Seybold Holyoke Aut. mill type Power Cutter.
45" White Automatic Power Cutter.
41" Hamblet Sheeter
80" Finley Sheeter
110" Hamblet heavy duty Sheeter.
68" Rice Barton & Fales Slitter & Rewinder, for use on dry end of paper machines
New 82" Two-Roll Back Stand, handling rolls up to 30" diameter
4 Waldron 30" Paper Reelers
Baling Machines, both hand and power.

THOMAS W. HALL COMPANY, Inc.
120 West 42nd St., New York 18, N. Y.
TF

FOR SALE

14 dryers 60 x 174". Sheahan carrier anti-friction bearings, felt rolls, framework.

SHARTLE BROS. MACHINE CO.
Middletown, Ohio O-25

FOR SALE—Economy Pulp Baler No. 841, Platen Size 60 x 36. Material can be piled 72" high. Motor operated. Complete with motor and controls. All in first class condition. Procel, Limited, East Palestine, Ohio. O-11

FOR SALE—Two Mammoth Junior Jordans, belt drive. One Wood Conveyor, about 200 ft. long, height 75 ft., with supporting A frames. FRANK H. DAVIS COMPANY, 175 Richdale Ave., Cambridge, 40, Mass. O-18

PAPER COATING MACHINERY — Waxing, Oiling, Gumming, Gluing, Carbon, Laboratory Coating and Treating Machines. High speed. New improvement. MAYER MACHINE COMPANY, Inc., 1155 Scottsville Road, Rochester, 11, N. Y. TF

FOR SALE—48" Langston Slitter and Rewinder, complete with motor and 17 sets of knives. Stony Brook Paper Co., 15 Lane Street, Waltham, 54, Mass. O-11

CLASSIFIED ADS BRING RESULTS

FOR SALE

FOR SALE

1—Completely rebuilt rubber covered Downingtown suction press roll—24" diameter x 92" drilled face—practically new.

J. J. ROSS COMPANY
250 Frelinghuysen Ave.
Newark 5, N. J.
Bigelow 3-3720 O-11

FOR SALE—1000 Cameron slightly used Slitter Knives—$1.00 each. Purchased from a war cancellation. Ross Machinery Corporation, 265 Passaic Street, Newark, 4, N. J. O-11

FOR SALE—50" Sheridan New Model Cutter in good working order. Address Box 45-655 care Paper Trade Journal. O-11

WANTED

WILL BUY
CAMERON SLITTING MACHINE
42" or Greater
24-3 or 26-3 DUPLEX

Suitable for slitting paper or cloth in rolls. Mr. Hugo, CHickering 4-5720

O-11

WANTED

Complete Steam and Diesel Plants for Export shipment. Send specifications to: Box No. 45-651, c/o Paper Trade Journal. O-11

WANTED

One or two-two-roll board calenders 40" wide or wider. Suitable for binder board.

SHARTLE BROS. MACHINE CO.
Middletown, Ohio
O-11

WANTED

1—Wet machine either single press or Rogers type; width from 72" to 96". Address Box No. 45-631, care Paper Trade Journal. O-11

IN the market for one used but in first serviceable condition Paper and Cloth-gumming Machine, 63" wide. Send proposals to Mr. Ciro A. Martinez, Purchasing Agent, Apartado Postal No. 755, Monterrey, N. L., Mexico. D-20

STEAM TURBINES
HELICAL GEARS
WORM GEARS
CENTRIFUGAL BLOWERS AND COMPRESSORS
CENTRIFUGAL PUMPS
PROPELLER PUMPS
CLOGLESS PUMPS
MIXED-FLOW PUMPS
DE LAVAL-IMO OIL PUMPS

DE LAVAL STEAM TURBINE CO.
TRENTON 2, NEW JERSEY

Appleton Wires are Good wires

APPLETON WIRE WORKS, INC. APPLETON, WIS.

WANTED

WANTED—Brightwood Box Machine. Address Box 44-636 care Paper Trade Journal. 11

WANTED — DISCARDED PAPER MILL FELTS. HIGHEST PRICES paid for all kinds of discarded paper mill felts. **LARGE or SMALL QUANTITIES accepted.** Prices quoted immediately on receipt of samples. **ADDRESS.** GLASER AND TOPPE, INC., 80 NORTH MAIN St., NATICK, MASS. 1F

WANTED—Cameron Type Slitter — width — minimum 62"—maximum 76"—state make—serial No.—condition and price with reply. Address Box 45-628 care Paper Trade Journal. N-29

WANTED — SEVERAL BUNDLING PRESSES FOR FLAT AND SQUARE BAGS, NEW OR USED. ROBERT P. WOLFE CO., FREMONT, OHIO. N-8

WANTED—W & P Shredders, Evaporators, Generators and Boilers, Slitters, Cutters, Hydraulic Presses, Sheridan Presses, Dryers. Address Box 44-635 care Paper Trade Journal.

WANTED—3 Rag Cutters. 2 Slitters and Rewinders any size up to 100" considered. 2 Hamblet Cutters. Address Box 45-607 care Paper Trade Journal. O-11

WANTED TO PURCHASE: Up to 250 tons per month of 33 lb. ground wood toweling. Address Box 45-647 care Paper Trade Journal. O-18

WANTED—EMBOSSING MACHINE around 60" wide, by middle west manufacturer. Address Box 45-646 care Paper Trade Journal. O-11

WANTED—Second hand cocktail napkin printing and folding machine. Give particulars as to size, manufacturer and price. Address Box 45-645 care Paper Trade Journal. N-1

WANTED—1—72" Slitter and Rewinder, similar to Cameron No. 10; 1—64" Seybold Paper Cutter. Address Box 45-642 care Paper Trade Journal. O-18

BLANKETS

Converted From Your Used Felts

Write for Full Details

BLOOMFIELD WOOLEN COMPANY
BLOOMFIELD, IND.

CLASSIFIED ADS BRING RESULTS

Within walking distance

IT'S not even too far to hobble, when you're leaving the blank walls of a hospital room for a brief while, on your way to a place of laughter and song and play.

The welcoming doors of a U.S.O. lounge club are just outside the hospital grounds — at more than 500 hospitals.

Here, at the house of smiles, war-shattered veterans escape from hospital routine, from the smell of ether and disinfectants. Here they enjoy their favorite phonograph records, today's newspaper, the checker-board that you gave them when you gave to your local community fund.

These are little things, but they're good medicine! The nearby U.S.O. lounge is theater, club—almost *home* —to the shocked and hurt boy whose present home is a hospital room.

Your donation to the community war fund supports the U.S.O. and 20 other agencies. It provides maternity care for wives of servicemen, wholesome recreation to keep children off the streets, help for the stricken people of our allies, and help for your own.

You help many who can't help themselves, yet you are asked for only one gift. Let your heart decide how big it should be.

Give generously to

Your Community War Fund

Representing the National War Fund

The right man may be seeking a job in an advertisement in this section.
The machine or the material you urgently need may be advertised right here in these columns.

Read Them, Use Them—If you need something, advertise for it—If you have something to sell tell the industry about it—Everybody reads the Clearing House.

38 Points of Superiority — ROTARY DISC REFINER Type 36-2 — a better product — a bigger profit—

WRITE FOR BULLETIN 2200 P3

SPROUT-WALDRON & CO. Muncy, Pa.

KOHLER AUTOMATIC WEB TENSION CONTROLS maintain an absolutely constant, uniform unwinding or rewinding tension from start to finish of each roll.

THE KOHLER SYSTEM COMPANY
159 E. CHICAGO AVENUE CHICAGO 11, ILL.

WHERE TO BUY

ABRASIVES
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.
Monsanto Chemical Co.
Norton Co

ADHESIVES
American Resinous Chemicals Corp.
Arabol Mfg. Co.
National Adhesives Division of National Starch Products, Inc.
Philadelphia Quartz Co.
Stein, Hall & Co., Inc.
United States Rubber Co.

AGITATORS
Appleton Machine Co.
Dilts Machine Works, Inc.
Dorr Company
Downingtown Mfg. Co.
Improved Paper Machy. Corp.
E. D. Jones & Sons Co.
D. J. Murray Mfg. Co.
Montague Machine Co.
Moore & White Co.
Noble & Wood Machine Co.
H. K. Porter Company Inc.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.

BAG MACHINES
Thomas W. Hall Co., Inc.
Potdevin Machine Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Weber, Herman G.

BARKERS AND CHIPPERS
Allis-Chalmers Mfg. Co.
Appleton Machine Co.
Carthage Machine Co.
Fibre Making Processes, Inc.
D. J. Murray Mfg. Co.
Valley Iron Works Co.

BARS
Dilts Machine Works, Inc.
E. D. Jones & Sons Co.
The Moore & White Co.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Simonds Worden White Co.
Valley Iron Works Co.

BEARINGS
Black-Clawson Company
Jones, E. D. & Sons Co.
The Manhattan Rubber Mfg. Co.
Montague Machine Works
Rollway Bearing Co.
Shartle Brothers Machine Co.
Shenango-Penn Mold Co.
SKF Industries Inc.
Timken Roller Bearing Co.
Valley Iron Works Co.
T. B. Wood's Sons Company

BEATERS & JORDANS
The Appleton Machine Co.
Black-Clawson Company
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
Herman Mfg. Co.
E. D. Jones & Sons Co.
Noble & Wood Machine Co.
J. J. Ross Company
Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works

BED PLATES
Bahr Brothers Mfg. Co.
Dilts Machine Works Inc.
Downingtown Mfg. Co.
Farrel-Birmingham Co., Inc.
E. D. Jones & Sons Co.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Simonds Worden White Co.
Valley Iron Works Co.

BELTING
Allis-Chalmers Mfg. Co.
The Cincinnati Rubber Mfg. Co.
Graton & Knight Company
The Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc.
J. E. Rhoads & Sons
United States Rubber Co
T. B. Wood's Sons Company
Worthington Pump & Machinery Corp.

BLEACHING APPARATUS
Improved Paper Machy. Corp.
E. D. Jones & Sons Co.
Perkins & Son, Inc., B. F.
Moore & White Co.
Niagara Alkali Co.
Noble & Wood Machine Co.
Pennsylvania Salt Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

BLOW PIPES & PITS
Montague Machine Co.
Moore & White Co.
Murray Mfg. Co., D. J.
Walworth Company

BOTTOMS
Harrington & King Perforating Co.
Kalamazoo Tank & Silo Co.
Valley Iron Works Co

BUILDERS—PAPER MILLS
Merritt-Chapman & Scott Corp.

CALENDERS
Downingtown Mfg. Co.
Farrel-Birmingham Co., Inc.
Lobdell Car Wheel Co.
Moore & White Co.
Black-Clawson Company
Perkins & Son, Inc., B. F.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works
Waldron Corp., John

CASEIN
Packing Products Co.

CASTINGS
Appleton Machine Co.
Black-Clawson Company
Dilts Machine Works
Downingtown Mfg. Co.
Farrel-Birmingham Co.
Fort Pitt Steel Casting Co., Div. H. K. Porter Company, Inc.
The Frederick Iron & Steel Co.
Grinnel Company
Hamblet Machine Co.
E. D. Jones & Sons Co.
Lobdell Car Wheel Co.
Magnus Metal Corp.
Montague Machine Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Shenango-Penn Mold Co.
Smith & Winchester Mfg. Co.
Taylor Engineering & Mfg. Co.
Union Machine Company
Union Screen Plate Co.
Valley Iron Works Co.
Walworth Company

CENTRIFUGAL MACHINERY
Bird Machine Co.
De Laval Steam Turbine Co.
Nichols Engrg. & Research Corp.
Ross J. O. Eng. Co
Shartle Brothers Machine Co.

CHEMICALS
Amer. Cyanamid & Chem. Corp.
American Resinous Chemicals Corp.
Ansul Chemical Co.
Calco Chemical Co.
Diamond Alkali Co.
Dispersion Process Inc.
Dow Chemical Company
E. I. du Pont de Nemours & Co., Inc.
General Dyestuff Corp.
Geigy Co., Inc.
Gottesman & Co.
Glidden Corp.
Hooker Electrochemical Company
The Mathieson Alkali Works, Inc.
Monsanto Chemical Company
National Oil Products Co.
Naugatuck Chemical Div. of U. S. Rubber Co
Niagara Alkali Company
Paper Makers Chemical Department, Hercules Powder Co.
Pennsylvania Salt Mfg. Co.
Pioneer Salt Company
Pittsburgh Plate Glass Co., Columbia Chemical Division
Solvay Sales Corp
Stauffer Chemical Company
United Sponge Rubber Co.
Witco Chemical Co.
Wyandotte Chemicals Corp.

CLEANING MATERIALS
Amer. Cyanamid & Chem. Corp.
Bird Machine Co
E. I. du Pont de Nemours & Co., Inc.
Paper Makers Chemical Department, Hercules Powder Co.
Magnus Chemical Co
Nichols Engrg. & Research Corp.
Oakite Products, Inc
Pennsylvania Salt Mfg. Co.
Philadelphia Quartz Co.
Pittsburgh Plate Glass Co., Columbia Chemical Division
Solvay Sales Corp
Wyandotte Chemicals Corp.
J. B. Ford Division

CLUTCHES
Appleton Machine Co.
Black-Clawson Company
Hudson Sharp Machine Company
Farrel-Birmingham Co.
Fawick Airflex Co. Inc
Horton Manufacturing Co.
Rodney Hunt Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
The Sandy Hill Iron & Brass Works
Stearns Magnetic Mfg. Co.
Valley Iron Works Co.
T. B. Wood's Sons Company

COATING MATERIAL
Glidden Corp.

COATING MACHINERY
Horton Mfg. Co.
Hudson Sharp Machine Company
Moore & White Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co.
Waldron Corporation, John
Weber, Herman G.

COMPRESSORS
Allis-Chalmers Mfg. Co.
De Laval Steam Turbine Co.
Ingersoll-Rand Co.
Nash Engineering Co.
Worthington Pump & Machinery Corp.

CONSTRUCTION ENGINEERS
Merritt-Chapman & Scott Corp.

CONSULTING ENGINEERS
W. H. L. D. Betz
Frederic C. Clark
Ferguson, Hardy S.
Hardy, George F.
Johnson & Wierk, Inc.
The Kohler System Company
Main, Inc., Chas. T.
J. E. Sirrine & Co.
Stone & Webster Engrg. Corp.

CONTROLS
The Bristol Company
Stickle Steam Specialties Co.

CONVEYORS
Black-Clawson Company
Murray, D. J. Mfg. Co.
Ross Engineering Corp., J. O.

CORES
Elixman Paper Co.
Sonoco Products Co.
Rodney Hunt Machine Co.
Montague Machine Co.
Smith & Winchester Mfg. Co.
Walker-Goulard-Plehn Co.

COUPLINGS
Black-Clawson Company
De Laval Steam Turbine Co.
Farrel-Birmingham Co., Inc.
The Frederick Iron & Steel
E. D. Jones & Sons Co
Lovejoy Flexible Coupling Co.
Moore & White Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works
Waldron Corp., John
Westinghouse Electric Corporation
Wood's Sons Company

CRANES
Northwest Engrg. Co.

CUTTERS
Thomas W. Hall Co.
Noble & Wood Mach. Co.
Perkins & Son, Inc., B. F.
The Smith & Winchester Mfg. Co.
Taylor Stiles & Co.

DAMPENERS
Perkins & Son, Inc., B. F.
Valley Iron Works Co.

DE-INKING
Kinsley Chemical Co.

DIGESTERS
H. K. Porter Company Inc.
Pusey & Jones Corp.

DOCTORS
Bird Machine Company
Black-Clawson Company
Downingtown Mfg. Co.
Lobdell C
Montague Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

DOCTOR BLADES
Black-Clawson Company
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.
Montague Machine Co.
Rotogravure Engrs. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers
United States Rubber Co.
Westinghouse Electric Corporation

DRIERS
Black-Clawson Company
Murray Mfg. Co., D. J.
J. J. Ross Company
Ross, J. O. Engineering Corp.
Rotogravure Engrs. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Traylor Engineering & Mfg. Co.
Valley Iron Works Co.
Waldron Corp., John

DRIVES
Allis-Chalmers Mfg. Co.
Appleton Machine Co.
Bird Machine Co.
Black-Clawson Company
Davis, Frank H., Co
De Laval Steam Turbine Co.
Dilts Machine Works
Downingtown Mfg. Co.
Farrel-Birmingham Co
General Electric Company
Horton Manufacturing Co.
Rodney Hunt Machine Co.
Montague Machine Co.
Moore & White Co.
Murray, D. J. Mfg. Co.
Noble & Wood Machine Co.
Pusey & Jones Corp
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co
T. B. Wood's Sons Co
Valley Iron Works Co
Westinghouse Electric Corporation

DUSTERS
Appleton Machine Co.
Downingtown Mfg. Co
Fibre Making Processes, Inc.
E. D. Jones & Son Co
Moore & White Co.
Noble & Wood Machine Co.
Norwood Engrg. Co.
D. J. Murray Mfg. Co.

DYESTUFFS
Calco Chemical Co.
Ciba Company
E. I. du Pont de Nemours & Co.
Geigy Co., The
General Dyestuff Corp.
National Aniline Division, Allied Chemical & Dye Corp
Paper Makers Chemical Department, Hercules Powder Co.
C. K. Williams & Co
Witco Chemical Co

EQUIPMENT INSTALLATION
Merritt-Chapman & Scott Corp.

EVAPORATORS
Black-Clawson Company
Goslin-Birmingham Mfg. Co., Inc.
Murray, D. J. Mfg. Co.
Swenson Evaporator Co., Div. of Whiting Corp.
Traylor Engineering & Mfg. Co.

FANS
General Electric Co.
B. F. Perkins & Son, Inc.
Ross Engineering Co., J. O.

FEEDERS
Builders-Providence, Inc.
Merrick Scale Mfg. Co.
Leeds & Northrup
Traylor Engineering Co.
Wallace & Tiernan

FELTS
Appleton Woolen Mills
Asten-Hill Mfg. Co.
Bloomfield Woolen Co.
Bulkley, Dunton Pulp Co. Inc.
Draper Bros. Corp.
Huyck & Son, F. C.
Lockport Felt Co.
Mt. Vernon-Woodbury Mills, Inc.
Morey Paper Mill Supply Co.
Orr Felt & Blanket Co
Shuler & Benninghofen
Waterbury Felt Co
Woodward, Baldwin & Co.

FELT GUIDES
Moore & White Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corp., John

FILLERS
American Colloid Co.
Amer. Cyanamid & Chem. Corp.
American Resinous Chemicals Corp.
W. H. Loomis Talc Corp
Vanderbilt Co., R. T.
Witco Chemical Co.

FILTERS
Moore & White Co.
J. O. Ross Engrg. Corp
Worthington Pump & Mchy. Corp.
Witco Chemical Co

FLOORING, GRATING & TREADS
Hendrick Mfg. Co.
Norton Co.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc.
United States Rubber Co.

FORMING MACHINES
Downingtown Mfg. Co.
Noble & Wood Machine Co.
Oliver United Filters
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co

WHERE TO BUY

GEARS
Black-Clawson Company
De Laval Steam Turbine Co.
Downingtown Mfg. Co.
Farrel-Birmingham Co.
E. D. Jones & Sons Co.
Moore & White Co.
D. J. Murray Mfg. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
Waldron Corp., John

GRINDERS
Farrel-Birmingham Co.
Lobdell Car Wheel Co.
Montague Machine Co.
Norton Company
Samuel C. Rogers and Company
The Sandy Hill Iron & Brass Works

GRINDING WHEELS
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.
Norton Company
Simonds Worden White Co.
United States Rubber Co.

HEATING, VENTILATING AND AIR CONDITIONING
The Appleton Machine Co.
Armstrong Machine Works
Fibre Making Processes, Inc.
E. D. Jones & Sons Co.
General Electric Co.
Grinnell Company
Leeds & Northrup
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
Ross Engineering Corp., J. O.
Shartle Brothers Machine Co.
Stickle Steam Specialties Co.
Valley Iron Works Co.
Worthington Pump & Mchy Corp.

HOISTS
Appleton Machine Co.
Dilts Machine Works
Rodney Hunt Machine Co.
Ingersoll-Rand Co.
E. D. Jones & Sons Co.

HOSE (Air, Water, Suction, etc.)
The Cincinnati Rubber Mfg. Co.
The Manhattan Rubber Manufacturing Division of Raybestos-Manhattan Inc
United States Rubber Co.

INSTRUMENTS, TESTING AND MEASURING
W. H. & L. D. Betz
B. P. Bowsher
The Bristol Company
Builders-Providence, Inc.
The Foxboro Company
General Electric
W. & L. E. Gurley
Leeds & Northrup Company
National Technical Laboratories
B. F. Perkins & Son
Taber Instrument Corp.
Taylor Instrument Cos.
Wallace & Tiernan Co., Inc.

JORDAN FILLINGS
Appleton Machine Co.
Bahr Brothers Mfg. Co.
E. D. Jones & Sons Co.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

KNIVES
Black-Clawson Company
Dilts Machine Works, Inc.
Hambler Machine Co.
E. D. Jones & Sons Co.
Simonds Worden White Co.
Valley Iron Works Co.

LABORATORY EQUIPMENT
Appleton Machine Co.
W. H. & L. D. Betz
Dilts Machine Works
E. D. Jones & Sons Co.
Leeds & Northrup Company
National Technical Laboratories
Noble & Wood Machine Co.
Taber Instrument Co
Taylor Instrument Companies
Valley Iron Works Co.

LAY BOYS
Hambler Machine Co.
Moore & White Co.
Shartle Brothers

LUBRICANTS
Gulf Oil Corporation
Gulf Refining Co.
Sinclair Refining Co.
Socony Vacuum Oil Co., Inc.
Sun Oil Company
The Texas Company
Vacuum Concrete Oil Co.

LUBRICATORS
[illegible]

MATERIAL HANDLING
Northwest Engrg. Co.

MICROMETERS & CALIPERS
Pratt & Whitney Co.
Montague Machine Co.
Lobdell Car Wheel Co.
Walker-Goulard-Plehn Co.

MIXERS
H. K. Porter Company
Youngstown Welding & Engrg. Co.

MOISTENING EQUIPMENT
The Spray Engineering Co.

MOTORS AND GENERATORS
Allis-Chalmers Mfg. Co.
De Laval Steam Turbine Co.
General Electric Co.
Ingersoll-Rand Co.
Reliance Electric & Engrg. Co.
Westinghouse Electric Corporation

PACKING BOXES
Johnson Corporation
Shartle Brothers Machine Co.

PACKING
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.
United States Rubber Co.

PAPER MACHINES
Black-Clawson Company
Downingtown Mfg. Co.
Thomas W. Hall Co.
Moore & White Co.
Pusey & Jones
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester

PAPER MACHINE SLICES
Black-Clawson Company
E. D. Jones & Sons Co.
Montague Machine Co.
The Sandy Hill Iron & Brass Works
Valley Iron Works Co.

PAPERMILL BUILDERS
Merritt Chapman & Scott Corp.

PAPER TWIN MACHINERY
Dietz Machine Works
Thomas W. Hall Co.
Hudson Sharp Machine Company
Langston Co., Samuel M.

PASTING MACHINES
Black-Clawson Company
Davis, Frank H., Co.
Murray, D. J. Mfg. Co.
Moore & White Co.
Pendevin Machine Co.
Shartle Brothers Machine Co.
Waldron Corp., John

PERFORATED METAL
Allis-Chalmers Mfg. Co.
Harrington & King Perforating Co.
Hendrick Mfg. Co.

PIPE
Black-Clawson Company
Crane Company
Grinnell Company
Shartle Brothers Machine Co.
Stowe-Woodward Inc.
Taylor Forge & Pipe Works
Walworth Company
Youngstown Welding & Engrg. Co.

PLATERS
Perkins & Son, Inc., B. F.

PLATES
Black-Clawson Company
Hendrick Mfg. Co.
J. O. Ross Engrg. Corp.
Shartle Brothers Machine Co.
Timken Roller Bearing Co.

PLUGS
Black-Clawson Company
E. D. Jones & Sons Co.
The Noble & Wood Machine Co.
Shartle Brothers Machine Co.

PRESSES
Black-Clawson Company
Farrel-Birmingham Co.
Dietz Machine Wks
Thomas W. Hall Co.
Hudson-Sharp Machine Co.
Paper Converting Machine Co., Inc.
Pendevin Machine Co
Rotogravure Engineering Co.
Shartle Brothers
Valley Iron Works Co.
Waldron Corp., John
Weber, Homer G.

PUG MILLS
Taylor Engineering & Mfg. Co.

PULPS
Andersen Co., J.
Bulkley, Dunton Pulp Co., Inc.
Gottesman & Co., Inc.
Elof Hansson, Inc.
Perkins-Goodwin Co.
Price & Pierce, Ltd
Pulp and Paper Trading Co.

PULPSTONES
Norton Company

PUMPS
Allis-Chalmers Mfg. Co.
Black-Clawson Company
Dorr Company
Downingtown Mfg. Co.
De Laval Steam Turbine Co.
Frederick Iron and Steel Co.
Hills-McCanna Co.
Ingersoll-Rand Co.
Johnson Corp.
Moore & White Co.
Nash Engineering Co.
Noble & Wood Machine Co.
Paper Converting Mch. Co.
Quimby Pump Co. Div. of H. K. Porter Company, Inc.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Warren Steam Pump Company
Worthington Pump & Machinery Corp.

RECOVERY SYSTEMS
Bulkley, Dunton Pulp Co., Inc.
Rodney Hunt Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Pusey & Jones
Ross Engineering Corp. J. O.
Valley Iron Works Co.

RECTANGULAR BINS
Traylor Engineering & Mfg. Co.

REELS
Black-Clawson Company
Downingtown Mfg. Co.
De Laval Steam Turbine Co.
Hudson Sharp Machine Company
The Kohler System Company
Montague Machine Co.
Moore & White Co.
Paper Converting Mch. Co.
Rodney Hunt Machine Co.
Rotogravure Engrg. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
The Smith & Winchester Mfg. Co.

REFINERS
Appleton Machine Co.
Bahr Brothers Mfg. Co.
Bauer Brothers Co.
Dilts Machine Works
The Hermann Manufacturing Co.
E. D. Jones & Sons Co.
Murray, D. J. Mfg. Co.
Noble & Wood Machine Co.
Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Sprout, Waldron & Co.
Sutherland Refiner Corp.
Valley Iron Works

REGULATORS
Allis-Chalmers Mfg. Co.
Armstrong Machine Works
Bird Machine Company
The Bristol Company
The Brown Instrument Co.
The Foxboro Company
Jones, E. D., & Sons Co.
General Electric Co.
Johnson Corp.
Leeds & Northrup Company
National Technical Laboratories
Noble & Wood Machine Co.
Shartle Brothers
Stickle Steam Specialties Co.
Taylor Instrument Companies
Wallace & Tiernan
Westinghouse Electric Corporation

RESINS
American Cyanamid & Chemical Corp.
American Resinous Chemicals Corp.
Glidden Corp.
The Resinous Products & Chemical Co.

ROLLS
Appleton Machine Co.
Black-Clawson Company
Downingtown Mfg. Co.
Farrel-Birmingham Co.
Improved Paper Machy. Corp.
Lobdell Co
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.
Montague Machine Co.
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
Perkins, B. F. & Sons Co.
Pusey & Jones Corp.
Roehlen Engraving Co.
J. J. Ross Company
Rodney Hunt Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Shenango-Penn Mold Co.
Sinclair Co.
Smith & Winchester Mfg. Co.
Stearns Magnetic Mfg. Co.
Stowe-Woodward Inc.
United States Rubber Co.
Valley Iron Works Co.
Waldron Corp., John

ROLL COVERS
The Cincinnati Rubber Mfg. Co.
Stowe-Woodward Inc.
Youngstown Welding & Engrg. Co.

ROLL STANDS
Cameron Machine Co.
Johnstone Eng. & Machine Co.
The Kohler System Company
Moore & White Co.
Pendevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co.

ROTARY KILNS
Traylor Engineering & Mfg. Co.

SATURATING MACHINES
Black-Clawson Company
Moore & White Co
Noble & Wood Machine Co.
Pendevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co.
Waldron Corp., John
Weber, Herman C.

SCALES
Builders-Providence, Inc.
Merrick Scale Mfg. Co

SCREEN PLATES
Fitchburg Screen Plate Co.
Magnus Metal Corp.
Morey Paper Mill Supply Co.
Union Machine Co.
Union Screen Plate Co.

SCREENS
Allis-Chalmers Mfg. Co.
Appleton Wire Works
Appleton Machine Co.
Bird Machine Company
Carthage Machine Co.
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
Harrington & King Perforating Co.
Hendrick Manufacturing Co
E. D. Jones & Sons Co
Montague Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Traylor Engineering & Mfg. Co.
Valley Iron Works Co

SCRUBBERS
Traylor Engineering & Mfg. Co.

SHEET MACHINES
Thomas W. Hall Co.
The Hermann Manufacturing Co.
Noble & Wood Machine Co.
Rotogravure Engrg. Co.
Valley Iron Works Co.

SHOWER PIPES
Bird Machine Company
A. E. Broughton & Co.
Downingtown Mfg. Co.
Improved Paper Machy. Corp.
Moore & White Co
Shartle Bros. Mach. Co.
Smith & Winchester Mfg. Co.

SHREDDERS
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The Dow Chemical Co
du Pont, E. I. de Nemours & Co
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Paper Makers Chemical Department Hercules Powder Co.
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Socony-Vacuum Co
Philadelphia Quartz Co.

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Carthage Machine Co
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Hudson Sharp Machine Company
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Rotogravure Engrg. Co.
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The Sandy Hill Iron & Brass Works
Smith & Winchester Mfg. Co.
Valley Iron Works Co
Waldron Corp., John

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The Spray Engineering Co.

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Allegheny Ludlum Steel Co.
Eastern Stainless Steel Corp.
Industrial Steels, Inc.

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American Cyanamid & Chemical Corp
Clinton Co.
National Starch Products, Inc.
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Shartle Bros. Mch. Co.
Stickle Steam Specialties Co.

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The Stanley Works

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Moore & White Co.
D. J. Murray Mfg. Co.
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The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.

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E. D. Jones & Sons Co.
Moore & White Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Westinghouse Electric Corp.

SULPHUR
American Cyanamid & Chemical Corp.
Stauffer Chemical Company
Texas Gulf Sulphur Co.
Witco Chemical Company

SULPHUR BURNERS
Valley Iron Works Co.

TALC
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W. H. Loomis Talc Corp.
International Talc Company

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The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.
The Noble & Wood Machine Co.
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Rodney Hunt
J. O. Ross Engrg. Corp.
Shartle Brothers Machine Co.
Stowe-Woodward Inc.
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Bulkley, Dunton Pulp Co. Inc.
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Dilts Machine Works
Dorr Co.
Downingtown Mfg. Co.
Montague Machine Co.
Moore & White Co.
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J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.

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Titanium Pigment Co.
R. T. Vanderbilt Co.
Witco Chemical Company

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Elwell Parker Electric Co.
Wright-Hibbard Ind. Elec. Truck Co

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Crane Co.
Grinnel Company
Johnson Corporation
Shartle Bros. Mch. Co.

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Noble & Wood Machine Co.
Shartle Brothers
Valley Iron Works Co.

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De Laval Steam Turbine Co.
General Electric Company
Hunt, Rodney, Mach. Co.
Westinghouse Electric Corp.
Worthington Pump & Machinery Corp.

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Gibbs-Brower Co.
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Rotogravure Engrg. Co.
J. J. Ross Company
Shartle Brothers Machine Co

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Crane Company
Dilts Machine Works
Fibre Making Processes, Inc.
The Foxboro Company
Hills-McCanna Co.
E. D. Jones & Sons Co.
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Magnus Metal Corp.
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Noble & Wood Machine Co
The Permutit Company
William Powell Co.
The Sandy Hill Iron & Brass Works
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Stickle Steam Specialties Co.
Taylor Instrument Companies
Valley Iron Works Co.
Walworth Company

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Weber, Herman G.

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Moore & White Co.
Montague Machine Co.
Noble & Wood Machine Co.
Pusey & Jones Corp.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

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Dietz Machine Works
Downingtown Mfg. Co.
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Hudson-Sharp Mach. Co.
Langston Co., Samuel M.
Johnstone Eng. & Machine Co.
The Kohler System Company
Montague Machine Co.
Moore & White Co.
Paper Converting Mch. Co.
Potdevin Machine Co.
Pusey & Jones Corp.
Rotogravure Engrg. Co.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Smith & Winchester Mfg. Co.
Waldron Corp., John

WIRES
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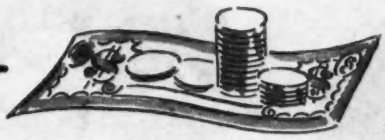
Trade this for this ; save and 

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